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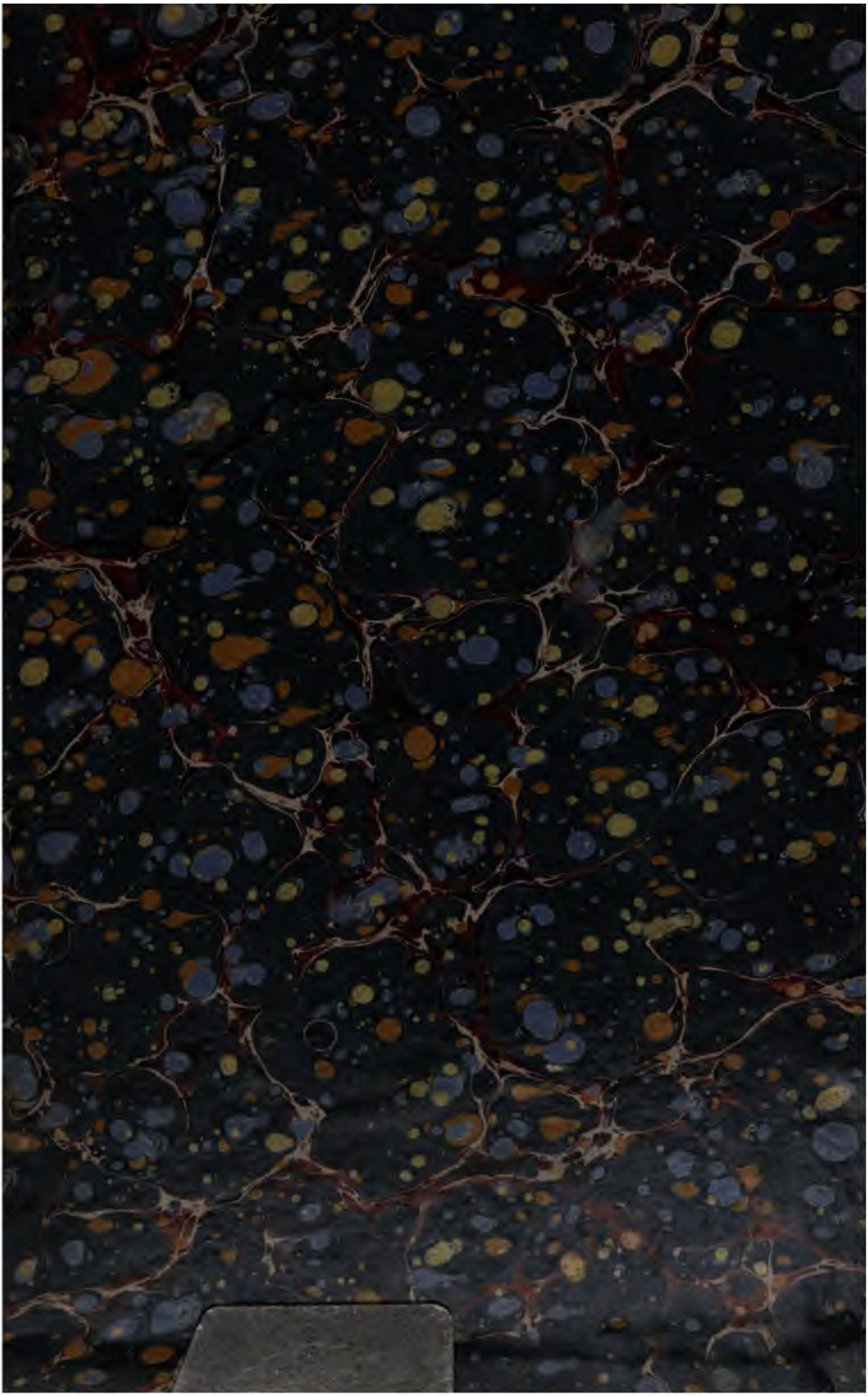

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AUGUSTUS RADCLIFFE GROTE, A. M.

The Canadian Entomologist

VOLUME XXVII.

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TO A. R. GROTE.

Lover of Night, in other lands than mine,
Of night made mystical by many a sprite
And bashful woodland fancies, made divine
By the moon's shining and the still starlight.

I greet thee, my twin Spirit. Tell thy tale
More often to thy listeners over seas:
Tell how the shadows brood o'er hill and vale:
Tell how the voices whisper on the breeze.

Call forth thy spectres robed in gauzy light,
Thy shadowy Indians and thy old-world fays.
So shall the Old World and the New unite
On Nature's bye-paths and Night's silent ways.

And when one day the still procession moves
To seek those realms that men call Heaven and Hell,
We twain may steal an hour, if none reproves,
To watch the Moths in meads of asphodel.*

G. M. A. HEWETT,
St. Winefride, Winchester, England.

AUGUSTUS RADCLIFFE GROTE.

We have great pleasure in presenting, with the first number of a new volume, the accompanying likeness of our much esteemed friend and constant contributor, Mr. A. R. GROTE, A. M., of Bremen, Germany. His name is familiar to every reader of the CANADIAN ENTOMOLOGIST, to which he began to contribute in 1870, when it was in its second volume, and his work is known and valued by every student and collector of North American Lepidoptera. We wish him, and all our friends and correspondents, a very happy and prosperous New Year. C. J. S. B.

*Printed in the Entomologist's Record and Journal of Variation, March 15th, 1894, page 76.

THE GENERA IN THE NOCTUIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

It must be conceded that there is a want of correspondence between authors as to the generic names employed in the *Noctuidæ;* perhaps a greater than in other families of Lepidoptera. The main cause appears to lie in the two systems of classification. The old system, under which the species were assorted into genera from their superficial characters, found its highest expression in the works of Guenée. The new system, commenced by Stephens and Lederer, deals with the ultimate structure of certain parts, and is yet working out its results in the direction which all systems must pursue, that of perfectly reflecting in our books the order which obtains in nature itself. To this end the new system must extend itself, and is extending itself, witness the work of Packard and Dyar, to a study of the insect in all its stages. Here a narrow insistence on any one character must defeat the general aim.

The want of correspondence above spoken of in the generic titles of the *Noctuidæ* is, then, greatly owing to the different systems which underlie the arrangement. Perhaps, in the one case, I ought to say the want of system. While, in the butterflies, there exists a more distinctly expressed correspondence between superficial characters, form, colour, pattern, size, and structural characters, this correspondence is greatly wanting in the moths, where series of very similar appearing species are found to be structurally very different. While, then, ancient and modern genera in the butterflies more nearly cover each other, and the generic types are more easily fixed upon as a whole, there is a wider divergence in the *Noctuidæ*. For instance, I will take the genus *Xylena*, Hübn., Tent. The type and sole species (therefore the type) of this genus is *X. lithoxylea*. This insect belongs to Stephens's later genus *Xylophasia*, a genus recognized variously as either distinct from or as a group of *Hadena*, or, again, as not being really separable by valid characters. The genus *Xylena*, Hübn., 1806, is then, a *Hadenoid* genus, proposed for a *Hadenoid* species. In 1816, Ochsenheimer, 4, 85, adopts the spelling and cites Hübner for the genus *Xylena*. But now comes the old system, and Ochsenheimer arranges 30 species under his genus *Xylena*, most of them strongly dissonant in structure. The modern system separates Ochsenheimer's species of *Xylena*, and breaks up his genus under some 12 different genera, and places these in different groups up and down in the family. The type of *Xylena* (*lithoxylea*) is also included by Ochsenheimer, and,

for his species, the genera *Lithomia*, *Calocampa*, *Lithophane*, *Hadena*, *Xylena*, *Actinotia*, *Dipterygia*, *Chariclea*, *Calophasia*, *Asteroscopus*, *Scotochrosta*, and yet others are now used. Unfortunately the generic title, becoming altered in spelling to *Xylina*, has been retained for the Lithophanoid forms, instead of the Hadenoid form, for which it was intended and to which it properly belongs. This mistake I set right in 1876; I show that *Xylophasia* is a synonym of *Xylena*, and that for the genus *Xylina* of authors the name *Lithophane* (1816) must be used. Only through such researches can we arrive at the certain titles of our genera, and if we would one day reach a stable nomenclature, if our aim is fixity and not laxity, the result of such studies must be adopted and held fast.

The type of each genus in the *Noctuidæ* should clearly be first positively ascertained, and the structural features of such type fully exposed. By comparison we can then group around such types the other species. We can ascertain the reasonable limits of the genera, weigh the characters of outlying forms which obscure these limits, and, through comparative studies in all stages, arrive at that condition of affairs in classification where a certain generic term covers a certain total structure, and its use calls up a picture of the greatest number of ascertained facts. The time will then come when the present personal, opinionative use of generic terms will give way to the scientific, impersonal one, when authority will no longer usurp the place of reason and research.

Acting again unfavourably upon the attainment of such a state of affairs in literature and conversation, is the tendency to make a difference, where in reality none exists, between authors as to the validity of their names arising from the alleged want of technical completion of publication. I am here concerned only with generic titles. I hope to show elsewhere that specific titles owe their recognition to a correspondence between the object and the published description, and that, where the supposed "type" of the original describer contradicts at all essentially the original text, the "type" must be considered spurious, since the reason for the name is to be found in literature, not in a labelled specimen. In generic titles we are, however, solely concerned with literature, because generic titles deal almost exclusively with already described species as a matter of fact. New genera, based only on new species, depend also largely upon the proper identification of the species, but these instances do not affect the older generic titles and play no part in our present investigations.

The difference made between authors, to which I above allude, as to generic names, is, that catalogue names, to which no description is appended, but under which the species are simply listed, are held to be of less value. But we can always know what is meant by them, and all that we seek in the present case is to find out an exact generic title for any one species as an impersonal literary fact. In an opposite view no criterion exists by which we can test the description. Almost all the older descriptions, so far as matter is concerned, are waste paper. Take for instance the cases of Walker and Hübner. Walker's generic descriptions in the *Noctuidæ* contain statements out of which we can usually make nothing. Take, for instance, that of *Feltia*. What is said would cover almost any of the entire *Noctuinæ*. The synonyms made by Walker would not and could not have been detected unless I, or some one else, had inspected his type. Had any one told him that his *Feltia ducens* was a specimen of *Agrotis jaculifera*, Guen. (=*subgothica* of Authors nec Haworth), Walker would have been obliged for the information, and simply thrown his label and MS. into the waste paper basket, where both rightly belonged. The real difference between Walker and Hübner is, that Walker says more and conveys little, while Hübner says little and conveys more. Practically we can never be at a loss for the proper use of a single generic title published by Hübner, so that under the law of priority we can properly refer all of them, without, as is often the case with Walker, first having to identify a badly described species. Where both authors propose genera for known species, there is in reason no difference to be made between them. Walker's diagnoses are generally no better than no description at all; not unfrequently are they positively misleading.

Leaving these two authors, we come to Ochsenheimer, and here the fact presents itself that Ochsenheimer's names which did not meet the adverse fate of Hübner's in the Tentamen, are also no better founded, and are "catalogue names" without a description. What sort of a description could Ochsenheimer indeed have given? So that several names now in use and never doubted have the same original right as Hübner's Tentamen names. I think this fact ought to lend my argument conclusive weight, added to the fact, proven by me, that Ochsenheimer adopted Hübner's names, and considered the Tentamen as properly published and as of authority. Ochsenheimer apologizes, in fact, for not having adopted more of Hübner's titles, because the sheet of the Tenta-

men had not reached him earlier. Probably some of the opposition to Hübner had its origin in the prejudice against a multiplicity of genera. With all such matters of feeling science has nothing to do in its impersonal researches after an exact generic nomenclature. What we seek is a stable name for certain generic types of structure, not a choice between authorities.

All who have studied the recent progress in the classification of our North American Noctuidæ, will recognize the fact that it is being carried out upon the lines laid down by me in the pages of this journal, lines which I took up from the writings of Stephens and Lederer on the Old World fauna and applied to the arrangement of the North American species. The new catalogues adopt my groupings. Here and there my reference of a species to a wrong genus, from a neglect to examine the single type, having no microscope at hand, or from a fear of injuring it before its return, is corrected—some half a dozen—but, as a whole, the species remain as I arranged them, and what changes are made are the natural result of observations on larger material, and, in any event, more apparent than real. That our classification can be bettered is certain. No one lifetime is long enough, outside of other occupation, to finally study our nearly 2,000 species of owlet moths and make all the comparisons necessary with the European and South American faunæ. It is hardly necessary for me to say this in the way of apology for the incompleteness of my work. All our work is fragmentary and incomplete. This fact is often forgotten, usually forgotten by new or younger writers, as also that all undue and unjust criticism will tell in the end against the user of such a weapon. Underlying all our entomological activities is the individual person, the more or less educated character, the mental force which time and opportunity develops and cultivation softens and perfects. Even in our very nature itself we are dual ; our actions are not always in accordance with our conceptions. I am reminded of this fact by an interesting statement of Prof. J. B. Smith's, who testifies to this duality (Proc. National Mus., XIV. 207) where he acknowledges that he had redescribed my *Mamestra purpurissata*, which has hairy eyes, as a species of *Hadena*, in which genus the eyes are naked. Prof. J. B. Smith says (l. c.) : "How I came to refer the insect to *Hadena*, I can not now understand, since my memoranda show that I *knew* the eyes were hairy."

Here is, then, the place for me to correct a former citation (with regard to *Noctuid* genera) of mine in the Buffalo Check List, 1876. Hübner is

the first to restrict the use of the name *Gortyna* to the specis *micacea*. His action makes it obligatory upon us to keep this type for *Gortyna*, and Guenée's name *Hydræcia*, proposed for the same identical type, must, as I have always insisted, fall. But, in my Buffalo Check List, I give the Tentamen, instead of the Verzeichniss, as authority. The fact is not in any way changed by my mistake in the citation. The citation is, thus, properly: "*Gortyna*, Hübn., Verzeichniss, 1816, 232, *micacea*, only species and therefore type." But Ochsenheimer's work has, although of the same dating (1816), priority; since I understand the Verzeichniss was not published completely in 1816, and Hübner probably took the name from Ochsenheimer, who does not cite Hübner. So we must call the genus *Gortyna*, Ochs., 1816, with the type *micacea*, as restricted by Hubner. The rest of my citation is correct; but again, at the close, under *Ochria*, I have fallen into the mistake of saying that this name is proposed for *flavago*, alone, in the Verzeichniss. This error probably arose because *flavago* is mentioned by itself at the top of Hübner's page 234, and I overlooked the fact that, on page 233, he has two more. Again, this mistake does not alter my statement that we must use *Ochria* for the type *flavago*. Hübner's first species is a *Xanthia*; Guenée has taken out the second as the type of his genus *Dicycla*; there remains for *Ochria*, then, *flavago* ALONE. We must reverse (as I have done) the terms proposed by Lederer for these genera. While it is proverbially human to err, it is a wise dispensation of Providence that out of all our errors there comes light—if not for us, then for those who come after us.

LECANIUM FLETCHERI, CKL.

In the September (1893) number of the CANADIAN ENTOMOLOGIST, page 221, Mr. T. D. A. Cockerell described under the above name a *Lecanium* found at Ottawa upon an ornamental cedar on the Experimental Farm. Only a few specimens were found at that time upon three or four bushes of a shrub which we have under the name of *Thuja Sibirica*. About the middle of last June, when at Stittsville, Ont., 15 miles from here, I found a few more specimens of this species upon the native cedar (*Thuja occidentalis*). The shrubs upon which the first specimens were found were originally imported from France six years previously, and there was, of course, the possibility that the scale insect, although of an undescribed species, might have been imported with it and overlooked. As it has now been found, however, and in larger numbers, some miles from here, upon our native "White cedar," there is no longer any doubt that it is indigenous.

J. FLETCHER, Ottawa.

THE AMERICAN SPECIES OF PERINEURA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N.Y.

The Abbe Provancher described two species of *Synairema* from North America, one from the Atlantic region and one from the Pacific region; a second species, from the Pacific region, is described below. The genus *Synairema* is considered as a synonym of *Perineura*, by Kirby.

1. The face, thorax, and legs marked with white.... *americana*, Prov.
   The face, thorax, and legs black..... .... 2.
2. The posterior tibia wholly black..... *pacifica*, Prov.
   The posterior tibia annulated with white..... *Kincaidia*, sp. nov.

Perineura americana, Prov.— ♀ "Black; face below the antennæ, inner orbital lines reaching the occiput and thence curving inwards, mandibles, clypeus, palpi, genæ, scape underside, a spot on each side of the median lobe of mesothorax, a spot on tegulæ, scutel, a point before and another one behind, apex of basal plates, pleura and pectus in parts, white. Antennæ long, slender, black, with a white spot on the scape underneath. Wings hyaline, nervures and stigma brown-black. Legs white, including coxæ and trochanters, the two anterior pairs with a black line exteriorly on their femora, tibiæ and tarsi; the posterior pair black, with coxæ, except a black spot outside, trochanters and basal third of femora, white; the spines of their tibiæ, except the tips, and a ring at the base of the first joint of the tarsus, also white. Abdomen elongated, black, shining, venter more or less whitish on the sides. Valves of the terebra black, shortly exserted."

Length, .46 inch.

Habitat, Cap Rouge, P. Q., Canada.

Perineura pacifica, Prov.— ♀ Black with the abdomen red. The head, thorax, feet, black without spots. Wings moderately smoky, the lanceolate cell contracted at middle, the costa and stigma black. Abdomen cylindrical, robust, red, with the first segment black, and a black spot, poorly defined, on the terminal segment. Length, .35 inch. (Translation.)

Habitat, Vancouver Island.

Perineura Kincaidia, n. sp.— ♀ Black; the labrum at apex slightly ferruginous; the abdomen beyond the first segment ferruginous; the lateral sheaths of the ovipositor black; the apex of the anterior femur and the front side of anterior tibia, fuscous; the mandibles spotted with white; the posterior tibia above on apical third with a white band; the

inner spur of the anterior tibia stout, broad, bifurcate at apex; the outer spurs of the anterior tibia and those of the middle and posterior tibiæ long, slender and simple; antennæ stout, thicker at apex, the third segment one-third longer than fourth; clypeus deeply emarginate; wings smoky, darker at base; stigma and costa black; the marginal cross-vein originating in the lower posterior angle of the stigma, and joining the third submarginal cell at the end of the second third; posterior wings with two middle cells; the lanceolate cell much shorter than the submedian cell. Length, 10 mm.

Habitat, Olympia, Washington. 4 ♀ ♀, May 28, July 2. Trevor Kincaid, collector.

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Habitat, Canada.

Kincaidia, sp. nov.

Habitat, Olympia, Washington.

Pacifica, Prov.

1886. *Synairema*, Provancher, Faun. Ent. Can. Supp., II., 15.
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Habitat, Vancouver Island.

*The lanceolate cell is said to have an oblique cross-nervure, and *Synairema* to have this cell closed in the middle.

COLEOPTERA OF LAKE WORTH, FLORIDA.

BY ANNIE TRUMBULL SLOSSON, NEW YORK.

I was much interested in Dr. Hamilton's paper on Lake Worth Coleoptera (CAN. ENT., XXVI., 250). I spent twelve days at Palm Beach, Lake Worth, last spring, and did a little collecting. I took 57 species of Coleoptera between March 9th and 21st. Of these, 36 are not included in Dr. Hamilton's list. I append the names of these, and add a few notes. I am indebted to Mr. Chas. Lubeck for identifications.

Casnonia ludoviciana, Sallé.
Apenes sinuata, Say.
Chlænius niger, Rand.
Selenophorus palliatus, Fab.
" iripennis, Say.
" gagatinus, Dej.
Philhydrus nebulosus, Say.
" cinctus, Say.
Staphylinus tomentosus, Grav.
Olibrus princeps, Sz.
Languria marginipennis, Sz.
Cicones lineaticollis, Horn.
Psammœcus Desjardinsi, Guer.
Hister abbreviatus, Fab.
" defectus ? Lec.
Cyphon padi, Linn.
Photuris frontalis, Lec.
Dinoderus porcatus, Lec.
Onthophagus hecate, Panz.
Aphodius vestiaria, Horn.
Criocephalus obsoletus, Rand.
Elaphidion truncatum, Hald.
" parallelum, Newm.
Leptostylus aculiferus, Say.
Lypsimena fuscata, Lec.
Spalacopsis suffusa, Newm.
Œdionychis thoracica, Fab.
Odontota bicolor, Oliv.
Coptocycla aurichalcea, Fab.

Sitophagus pallidus, Say.
Blapstinus fortis, Lec.
" estriatus, Lec.
Alphitobius piceus, Oliv.
Pteniopus Murrayi, Lec.
Lixus lævicollis, Lec.
Cryptorhyncus bisignatus, Say.

I found but one specimen of *Casnonia ludoviciana*. It was in the sand at the roots of a species of *Crotalaria*, near ocean beach. *Seleno-phorus iripennis* was very common under boards and rubbish just back of the hotel. Several specimens of *Philhydrus nebulosus* flew into my room at night. *Staphylinus tomentosus* was found under decaying cabbage leaves in garden patches. What I now suppose to be the *Belonuchus formosus*, var. of Dr. Hamilton's list, was plentiful in situations similar to those he mentions, "under damp rubbish" and decaying vegetation. *Photuris frontalis* was the only "firefly" I saw, coming about piazza of hotel and into the rooms. On the white sand near ocean beach, in the sparse and scattered semi-tropical vegetation, several species were constantly found in great profusion. Among these, *Blapstinus estriatus*, was perhaps the most common, and could be taken by hundreds. With it was always found a hemipter, *Corimelæna*, sp. ; so like its coleopterous companion superficially, that I at first, in gathering them quickly into my bottle, did not detect the difference, but the characteristic odour soon betrayed them. In the same situations *Mecynotarsus elegans* occurred in great numbers. Dr. Hamilton's allusion to their presence on "sand, hot enough to blister," appeals to me forcibly. I never saw, or felt, anything so scorching. I also noticed the tiny ant found in their company, and so like them in general appearance and habit ; and wrote of it to Mr. Lubeck. He finds *Mecynotarsus candidus* on sandy places in New Jersey, but says nothing of any ant as associated with it. *Ptenio-pus Murrayi* flew to light in the evenings, and I took at least two or three every night. On the wall of my bedroom one evening, I captured two specimens of the little weevil, *Cryptorhyncus bisignatus*, and this summer I took the same species on the summit of Mt. Washington !

GENITALIC CLASSIFICATION.

BY REV. GEO. D. HULST, BROOKLYN, N. Y.

In the August number of the CANADIAN ENTOMOLOGIST, Vol. 26, p. 215, under the subject "An Omitted Phycitid," Mr. Grote speaks disparagingly of my having established a subfamily upon differences in genitalic structure, and says: "Messrs. Scudder and Burgess first gave us genitalic species; Lederer used the genitalia for subgeneric and generic divisions, and latterly is followed by Smith. Now comes Mr. Hulst, whose mission seems to be to carry out the methods of other entomologists to extremes, and give us genitalic subfamilies."

So far as the above touches upon science I wish to speak.

There are only two questions to answer in defense of the use of genitalic characters in classification: the one,—Is the method scientific? and the other,—Is it warranted in the case under discussion?

First,—Is it scientific? The structure of the genital organs belongs to those phases of structure ordinarily known as secondary sexual characters. These all stand in the same category in classification. If one can be used, another may be, and may be of equal value. But from the beginning systematists have made abundant use of such of these characters as were known to them, for not only subfamily, but even higher divisions. For example, in the paper of Mr. Grote, referred to above, he says: "In 1878 I separated the *Epipaschiinæ* (*Epipaschiæ*) from the *Phycitinæ* (*Phycidæ*). The two groups I regard as divisions of the Pyralidæ, equal in value to the Crambinæ and Galleriinæ." These are one step higher than the division I made based upon the genitalia. But Mr. Grote's division was based upon a secondary sexual character, the presence of a peculiar development on the basal segment of the male antennæ. I conclude, therefore, it *is* scientific to make use of any secondary sexual character. The use of the structure of the genitalia in classification is therefore scientific. But to be of scientific importance, and properly used, structural characters must be so permanent that their variations can be relied upon. Is this true with the genitalia? It can, I think, be affirmed, that no other secondary sexual character can be so confidently relied upon. The universal testimony of those who have made a study of genital structure is entirely in accord with this truth. One can with more absolute certainty, where there is variation, tell an insect by the genital structure, than by any other—often all other means.

But, secondly,—Is the use of genital structure warranted in the case under discussion? Of course all distinctions in classification are to an extent artificial, and a matter of opinion; but we will probably all agree that for family or subfamily distinction there ought to be not a simple difference in structure, but in the *type* of structure. If there be a typal difference, the distiction may be made even though intergrades exist. For example, so far as the antennal process is concerned, the *Epipaschiinæ* grade insensibly into the *Phycitinæ*. But, as the structure is very peculiar, they may properly be separated. In the *Phycitinæ*, Mr. Ragonot bases a separation upon the tongue. His basis, however, is not one of type, but of degree, with all intergradations existing, and therefore should not be allowed for anything higher than genera. But the genital structure is of two radically different types, sharply distinct, and so far as I know (and I have examined almost every American species), without any tendency to intergrade; subfamily distinction is therefore fully warranted.

I do not stand alone in this my opinion. I think there will be no question there is no one living better able to give a judgment in the case, or more honest in his utterance of judgment at all times, than Prof. Fernald. In a notice of my monograph of the "*Phycitidæ* of N. A.," CAN. ENT., Vol. 22, p. 191, Prof. Fernald says: "Mr. Hulst divides the family into two subfamilies, based on the presence or absence of the lower anal plate, and differs from Ragonot, who divides them on the development of the tongue; from my own studies I am inclined to agree with Mr. Hulst."

After writing the above, I wrote to Prof. Fernald, indirectly asking his present views upon this subject. His answer I have his permission to use as I please. I therefore quote a considerable part of it, which directly bears upon the subject before us, and which also gives a considerable amount of very interesting history upon the bringing into light of the structure of the genitalia as a prime factor in classification.

Prof. Fernald says in part: "In 1877 I began my studies of the *Tortricidæ*, at the suggestion of Mr. Grote. In 1880 I read a paper before the Entomological Club, at the Boston meeting of the American Association for the Advancement of Science, in which I stated that I was able to separate the subfamilies of the *Tortricidæ* by means of the genitalia. I had prepared and studied the genitalia of a large number of species, and also of individuals under the species. I showed at that meeting a large number of drawings made from the objects by means of

the camera. In these studies I found characters by means of which I could separate the species; others which separate the genera; and still others which separate the subfamilies, or families, as some call them. As the Club was not a part of the American Association, the paper was not published, nor has it ever been published, though many of our prominent entomologists were present and heard my paper."

"Mr. Meyrick, in his Descriptions of New Zealand Microlepidoptera, Phil. Inst. of Canterbury for 1884, p. 141, after giving a recasting of his definition of the *Tortricidæ* and *Grapholithidæ*, says: 'I am indebted to Professor Fernald, well known as a special authority on this group, for the information on which this change is founded. He states that the genital uncus never occurs in the *Grapholithidæ*, and considers that such genera as *Ctenopseustis*, hereafter described, should be therefore referred to the *Tortricidæ;* which amounts to saying, that the possession of the uncus is a more valuable systematic character than the possession of the basal pectination (of the median fold of the hind wing). As Professor Fernald has devoted much labour to the investigation of material from all parts of the world, there is little doubt that he is correct, and I have adopted his suggestion. I have not yet found leisure to examine the genitalia of all the *Tortricina* of this region, but I have investigated a few species, which appear to confirm his views; and in the case of the *Pyralidina*, I have found the same character valuable for family separation.'" "In the same paper, page 146, Mr. Meyrick establishes the genus *Ctenopseustis* for Walker's *Pædisca obliquana*, and under it says: 'Professor Fernald assures me that the genital uncus of the male (the value of which as a divisional character he was the first to discover in this group) is never developed in the *Grapholithidæ*, and that this species should be included in the *Tortricidæ*, notwithstanding the pectination of the lower median vein, this latter structure being indeed also found in *Oenectra*, which is certainly referable to the *Tortricidæ*. In this view I quite concur, and therefore place the species here, which involves the formation of a new genus for its reception.'"

"I write this to show why I could speak so confidently of the value of your classification of the Phycids."

It will thus be seen that my use of the genitalia in classification, while independent of, because I was ignorant of, the work of Prof. Fernald and Mr. Meyrick, was far from being original in time or in inception. Prof. Fernald was the pioneer in the work, and to him belongs the greater guilt,

if guilt there be, and the greater, if not all the praise, if praise be merited, as I most emphatically believe it is.

But in view of all that is above, it will, I think, appear that my distinction in the *Phycitidæ* is warranted. Genitalic differences may be used in classification, and when the type of structure is different, may be used for distinctions higher than genera, and finally, that no ordinary differences in elemental structure afford a better basis for classification.

This is all written upon the assumption that the form of the genital organs is a *secondary* sexual character. Some of our best systematists regard this structure as a *primary* sexual character. Prof. J. B. Smith is of this opinion, and his opinion is of the highest value. In that case the value of the structure of the genitalia in classification is much increased, and family distinction based upon it is the more fully warranted.

NOTES ON CARAMA AND OTHER MEGALOPYGIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

Recently, I was informed by a friend that he had a Carama from Washington, D. C. I naturally expected to see *C. cretata*, Grt.; but the specimen now before me proves to be *Carama pura*, Butl. This raises the question of the validity of the specific characters used in the genus. Caramas are rare in the United States, and it seems scarcely probable that we have more than one species. Mr. Baker, in his review of Carama, does not refer to *cretata*, Grt., though it is the fourth name in point of priority. It is evident from his synopsis, however, that *cretata* differs from *ovina*, Sepp., only in having the yellow colour confined to the vertex of the head, and from *discrepans*, Wall., in its smaller size and white front.

I am of the opinion that these characters are nothing but individual variations, and I think we shall be safe in adopting the following synonymy. Probably several other names must come in, but I will go no further at present than the specimens before me seem to warrant.

CARAMA OVINA, Sepp. (front pale.)

cretata, Grote.

var. VIRGO, Butl. (front dark.)

pura, Butl.

In the revision of North American "Bombyces," by Mr. Neumœgen and myself, we include the genera Dalcerides and Eupoeya among the

Megalopygidæ (Lagoidæ). We recognized that the former did not belong here; but it seems nearer this family than any other, and was so placed, pending further study of the South American fauna, when it will probably find place in a new family.

As to Eupoeya, I am inclined to believe that it belongs to the Megalopygidæ, though the branching of the radial nervules of primaries is rather unlike the typical form, and Dr. Packard's figures do not show a branch to vein 1.

I find that *Sciathos punctigera*, Linn., belongs to the Megalopygidæ (Kirby's Cat., p. 540, next to Sibine in the Limacodidæ).

The genera so far shown to belong to this family separate as follows:—

Vein 7 arising nearer base than 9.....*Eupoeya*, Pack.

Vein 7 arising beyond 9.

Vein 10 from a stalk.

Veins 3–4 of secondaries stalked.....*Carama*, Walk.

Veins 3–4 of secondaries not stalked.

Vein 8 of secondaries united to 7 to outer third of cell.....*Ochrosoma*, H. S.

Vein 8 united to 7 nearly to tip of cell....*Sciathos*, Walk.

Vein 10 of primaries from the cell.....*Megalopyge*, Hübn.

Eutheca (Sapinella, Kirby*) mora*, Grote.

Lord Walsingham has kindly sent me the following information:—"An examination [of the type in the British Museum] shows it to be an Anaphorid with 12 separate veins in the forewings and eight in the hindwings. I can scarcely distinguish it from *Pseudanaphora arcanella*, Clem., of which it may be the ♀, which is unknown so far as I am aware." The name may be removed from the list of unidentified Bombyces, and the genera *Eutheca*, Grt., and *Sapinella*, Kirby, relegated to the synonymy.

CORRECTION.

In the list of Dragonflies of Corunna, Mich. (C. E. XXVI., p. 345, December, 1894), *Calopteryx apicalis*, Burm., should be *Calopteryx æquabilis*, Say.

D. S. KELLICOTT.

ON A NEW SCALE-INSECT FOUND ON PLUM.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Some time ago, Prof. Gillette sent me a few specimens of an *Aspidiotus* found on plum at Cañon City, Colorado, 31st Aug., 1894. They occurred on the fruit itself. He had previously sent the species to Mr. L. O. Howard, who had written that it was apparently new. The material sent was not altogether satisfactory, owing to the fact that the insect occurs solitarily on the fruits, and has to be collected by slicing off bits of the skin. Consequently it is inconvenient to obtain it in quantity, and not very easy to nicely preserve those obtained. However, the discovery of a new *Aspidiotus* on plums in the United States was a matter of importance, and deserved the most careful consideration. It now appears, after some study and correspondence, that the species is really new, as at first supposed, and it may be introduced as follows :—

Aspidiotus Howardi, n. sp.

♀ scale circular, flat, about 1½ mm. diam., pale greyish with a slight reddish tinge ; exuviæ sublateral, covered, dull orange, secretion over exuviæ easily rubbed off.

♀ broadly pyriform, orange ; margin of terminal portion thickened, very finely striate, showing a violet colour in some lights. Plates spine-like, sparingly branched. Median lobes very large and prominent, close together but not contiguous, obliquely truncate, slightly crenate. Second pair of lobes small, broad and low. Third pair practically obsolete. There are conspicuous "wax ducts."

This species belongs to a series with circular or nearly circular ♀ scales; and more elongated, somewhat oval ♂ scales. The covered exuviæ are orange or reddish, and easily exposed by rubbing. The median lobes of the ♀ are large, the others comparatively small, or obsolete. Such species are *A. perniciosus*, Comst., *A. ancylus*, Putn., *A. punicæ*, Ckll., *A. ostreæformis*, Curt.

In *perniciosus*, one does not find the same array of plates as in *Howardi*, and there are the characteristic "incisions" between the lobes. Moreover, *perniciosus* always lacks the grouped glands.

Turning now to *ancylus*, we find a species with grouped glands when mature, but presenting also the "incisions" as in *perniciosus*. It has not, either, the same arrangement of plates as *Howardi*. *A. juglans-regiæ* is clearly out of the question, by superficial appearance alone. The West

Indian *punicæ* differs clearly in the scale, and it will suffice to say, without further details, that *Howardi* is not identical with any known neotropical species.

Having thus satisfied ourselves that it is no known American species, nearctic or neotropical, we naturally turn to Europe. Is it *A. ostreæformis* of Curtis? I have examined *ostreæformis* from Isleworth, England, (Geo. Manville Fenn), on peach; also from Rouen, France (sent by Mr. Morgan). It is quite manifestly not *Howardi*, though in some respects like it; *ostreæformis* has the median lobes well notched without, the second lobes longer and narrower, a pair of curious tooth-like plates beyond, numerous orifices in the groups of ventral glands, etc. On the whole, *ostreæformis*, *perniciosus* and *ancylus* appear to be nearer to one another than either to *Howardi*.

Lichtenstein's *A. pyri* is presumably the *ostreæformis*, formerly confounded, as remarked, with a *Diaspis*. But he says the ♂ scale is rounded, whereas it is surely oval—at least in true *ostreæformis*, as in *Howardi*. As for other European species, I find none that will agree with our insect.

There is one other species of *Aspidiotus* that seemed very like ours, and that is *A. spinosus*, Comst., found on Camellias in the conservatory of the Dept. Agriculture at Washington, the original habitat being unknown. The food-plant suggests Japan, and when I noticed the resemblance to *Howardi* in this insect I was much interested, having already thought of the probability that our species came on Japanese fruit trees, the importation of which has lately become increasingly popular. Judging by Comstock's figure of *spinosus*, it might seem that they could not be the same; but the figure shows only one pair of lobes, the description giving second and third pairs, though stating that they are small.

At this point I should have been inclined to let the matter drop, or await further developments, but for the kindness of Messrs. Howard and Pergande, in Washington. Having put my difficulty to Mr. Howard, he turned the matter over to Mr. Pergande, who prepared the appended report. This report seems to indicate that Comstock's figure of *spinosus* is more correct than his description; but, in any case, it practically settles the difficulty as to the possible identity of *Howardi* with *spinosus*. I had not myself seen the grouped ventral glands in *Howardi*, but Mr. Pergande shows that they exist.

With regard to the name of the species, it is a pleasure to dedicate it to Mr. Howard, to whom we are so greatly indebted for information regarding parasites of Coccidæ.* The present species, *Howardi*, is infested by a dark brown Chalcidid parasite.

As to the origin of *A. Howardi*, nothing certain can yet be said, but it is still possible enough that it comes from Japan. At all events, horticulturists should be on the look-out for it, and some care should be exercised that it may not spread widely over the country. Attacking the fruit, it would surely interfere with their market value, even if not seriously injuring the tree.

Mr. Pergande, on A. Howardi and A. spinosus.

"Examined and compared typical specimens of *Asp. spinosus* with *Asp. Howardi*, with the following results:—There can be no doubt that the two are distinct species. *A. Howardi* is considerably larger than *spinosus;* measuring 1 mm. in length [=adult ♀], whereas the largest one of *spinosus* is but 0.6 mm. in length.

"The anal segment of *A. spinosus* presents the following characters:—There is but *one pair of anal lobes visible.* The spines on either side of these lobes are numerous, more or less distinctly toothed, grouped closely together and occupying the terminal third of the segment. [These spines are the spine-like plates.]

"There are but 4 groups of spinnerets, of which the anterior pair of groups is composed of 2 to 5, and the posterior pair of 2 to 4 pores. *There appears to be but one row of more or less irregularly arranged, often quite indistinct, oval pores* between the groups of spinnerets and the lateral margin.

"In *Asp. Howardi*, of which I had but a single specimen for examination, there are *two pairs of well-developed terminal lobes;* while the spines are longer and stouter than in *A. spinosus*, they are also more scattered and cover about the posterior half of the segment. There are also but 4 groups of spinnerets, the anterior pair of which is composed of from 6 to 7, and the posterior pair from 3 to 4 pores. *The oval pores are large and distinct, forming two rows*, besides a few near the anterior end of the lateral margin.

*The North American Hymenopterous parasites of Coccidæ have been described as follows:—By Howard, 44; by Ashmead, 7; by Riley, 2; by Fitch, Le Baron, Emily A. Smith, Walker, Craw and Cook, 1 each; total, 59 species. There are a few others erroneously recorded as Coccid parasites, or only doubtfully parasitic on Coccidæ.

"Of *A. spinosus*, I examined 16 specimens, all of which agree with each other in every particular, while *A. Howardi* shows distinct and marked differences." (Oct. 29, 1894.)

It will be seen from the above, that the credit of differentiating this new species is very largely due to Mr. Pergande. Although this beginning of our information concerning it is very inadequate, there will, I trust, be no further difficulty about its separation from its congeners, thanks to Mr. Pergande's excellent comparative studies. It is apparent from this and other similar instances, how great is the advantage of having the types preserved in some place where reference can be made to them. Descriptions are often imperfect, and even those by the best authors frequently omit some characters differentiating the species from others not at that time discovered.

[P. S.—I have just received the following information from Prof. Gillette regarding the occurrence of *Aspidiotus Howardi*:—"A very few scattering scales were found in one orchard at Cañon City—the owner of the orchard I do not know—and the others were all found on the fruit of a native plum tree. The tree was in the back door-yard of a Mr. Helm, and growing beside a tight board fence. Most of the scales were on plums next the fence and near the ground in the shade. Most of the fruits in that position had from one to three or four scales."—T. D. A. C.]

PRELIMINARY STUDIES IN SIPHONAPTERA.—I.

BY CARL P. BAKER, FORT COLLINS, COLO.

The following will form the first of a series of papers on the Siphonaptera, in which will be mentioned all known species, together with such new species as have come to my notice. Besides what has been drawn from the examination of a large series of specimens in my own collection, and many kindly sent me by Taschenberg, Howard, Bruner, Osborn, Comstock and others, I have borrowed freely from previous papers on the subject, and especially from Taschenberg's "Die Flohe."

The existing number of species of this order will undoubtedly be found to very greatly exceed the number already known. A large proportion of mammalian animals probably act as hosts to various species of fleas, but the list of hosts as at present known is comparatively very small indeed. The group, though certainly an interesting one, has been very much neglected. I would suggest that during the immediate future, collectors in all quarters pay particular attention to the collecting of these forms.

Order *Siphonaptera*, Latr.*

1798. Schellenberg, Helvetische Entom. I., p. 15. (Rophoteira.)
1801. Lamarck, Syst. d. Anim. s. Vert., p. 313 (Aptera.)
1805. Latreille, Hist. nat. des Crust. et des Insect. XIV. (Suctoria.)
1825. Latreille, Fam. nat. du Regne Animal. (Siphonaptera.)
1826. Kirby and Spence, Introd. to Entom. IV. (Aphaniptera.)
1829. Stephens, Cat. Brit. Insect. (Pulicidæ.)

Wings entirely absent; mouth parts suctorial; maxillary palpi four-jointed;† labrum and clypeus wanting; eyes, when present, two in number and simple; antennæ three-jointed; tarsi five-jointed. Metamorphosis complete, larva footless, with a well-developed head.

Table of Families.

Small fleas with a proportionally very large head; thoracic rings very narrow; pregnant female a stationary parasite, with abdomen worm-like or spherical; labial palpi one-jointed; third joint of antennæ without transverse incisions; no "combs" of spines on head, thorax, or abdomen; eyes present; species tropical or subtropical.... *Sarcopsyllidæ.*

Larger fleas with a proportionally small head; thoracic rings broad; head, pronotum, or abdomen often with "combs" of spines; antennal grooves sometimes covered on the outside by a chitinous scale; antennæ with terminal joint transversely creased, or cleft into lamellæ on one side; eyes sometimes absent; species widely distributed.

Labial palpi with more than ten joints; abdomen in pregnant female becoming so swollen as to lose its original shape.. ... *Vermipsyllidæ.*

Labial palpi three to five-jointed; never a stationary parasite, and never with the abdomen so swollen that the original form is lost... *Pulicidæ.*

Fam. *Sarcopsyllidæ*, Tschb.

1880. Taschenberg, Die Flöhe, p. 43.

Table of Genera.

Head angulated above in front; maxillæ very small, scarcely projecting; abdomen of pregnant female spherical with sutures obsolete. *Sarcopsylla.*

* Rophoteira, in part; aptera, in part; suctoria, pre-occupied.

† Packard, in a late paper (Proc. Bost. Soc. Nat. Hist., XXVI., Sept., 1894, pp. 312-355), follows some of the old authors in calling the maxillary palpi five-jointed (l. c. p. 348). I cannot see the reason for reiterating statements that have been proven incorrect. In the near future, I will review those portions of this paper which seem to be original.

Head evenly rounded from occiput to mouth ; maxillæ large, curved, projecting downward and backward ; abdomen of pregnant female worm-like, sutures distinct..... *Rhynchopsylla.*

Genus *Sarcopsylla*, Westwood.

1836–40. Westwood, Trans. Ent. Soc. London, II., p. 199.

Table of Species.

Hind angles of metathoracic scales rounded; eyes and antennæ in anterior half of head, which is acutely angled in front above ; first four tarsal joints in foreleg longer than broad ; length (free female, and male), 1 mm. ; parasitic on mammals..... *penetrans.*

Hind angles of metathoracic scales angulated ; eyes and antennæ in posterior half of head, which is obtusely angled in front above ; first four tarsal joints in forelegs nearly as broad as long ; length, 1–1.5 mm.; parasitic on gallinaceous birds..... *gallinacea.*

Sarcopsylla penetrans, L.

1767. Linne, Syst. Nat. Ed., XII., p. 1021. (Pulex penetrans.)

This flea is undoubtedly found throughout the tropical and sub-tropical regions of both hemispheres. It has been found on a great variety of mammalian animals, including man. It is commonly known in this country and South America as "jigger flea," "chigoe," or "chique."

Sarcopsylla gallinacea, Westwood.

1874–5. Westwood, Ent. Mo. Mag., XI., p. 246.

This species will probably eventually be found to occur throughout the range of *S. penetrans*. I have received specimens taken on chickens (through Mr. L. O. Howard) from the Department collection, as follows:—From Florida, Apr. 27, No. 6220, A. S. Packard ; from Floresville, Texas, No. 3648 ; from Hockley, Texas, Jan. 30, 1894, No. 3648 ; from Meridian, Miss., No. 4053.

The genital organs in the male of this species differ quite widely from those of the male of *S. penetrans*.

Sarcopsylla grossiventris, Weyenberg.

1879 Weyenberg, Boletin de la Acad. Nat. de Ciencias d. 1. Repub. Argent., III., p. 188. (Pulex grossiventris.)

This is a Sarcopsylla and a good species, but was insufficiently described. The very large size (length of male, 2.5–3.25 mm.; of pregnant

female, 6–6.5 mm.) and the small metathoracic scale would separate it from *S. penetrans*. It was found on *Dasypus minutus*, Desm., and is probably restricted in range to southern South America, as nothing of the sort seems to have come to the notice of Bonnet.

Genus *Rhynchopsylla*, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d.Wiss.Wien., XL.,p. 462. (Hectopsylla.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla.)

This genus contains but one species,

Rhynchopsylla pulex, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d. Wiss., Wien., XL., p. 462. (Hectopsylla psittaci.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla pulex.)

First mentioned by Frauenfeld, as taken from a species of Psittacus. Later was also found on a Molossus, sp.

Fam. *Vermipsyllidæ*, Wagner.

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1–2, p. 205.

The family contains but one genus,

Genus *Vermipsylla*, Schimkewitsch.

1885. Schimkewitsch, Zool. Anz., No. 187.

Wagner (l. c.) characterizes this genus as follows :—Terminal antennal joint with nine circular incisions; mandibles double the length of maxillary palpi; labial palpi with 11 to 13 pseudo-joints; pregnant female with swollen abdomen. Parasitic on Ungulates.

Vermipsylla alacurt, Schimk.

1885. Schimkewitsch, Zool. Anz., No. 187. (Female.)

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1–2, p. 205. (Male.)

(*To be continued.*)

BOOK NOTICE.

"Kritisches Verzeichniss der Myrmekophilen und Termitophilen Arthropoden mit Angabe der Lebenweise und mit Beschreibung neuer Arten. Von E. Wasmann, S. J., Berlin, Felix L. Dames, 1894."

Under the above title, Dr. Wasmann has given us the greatest contribution to this interesting subject ever made, and one that must become a classic in Entomology. The work is published in the form of an octavo brochure of some 248 pages, and is gotten up in a fine style of the printer's art.

A few pages of introduction preface the main body of the work, giving a short history of the study of myrmecophiles and termitophiles, and stating the difficulties arising in the study of the matter and lying in the way of the preparation of such a Catalogue as the present. The number of accidental or transient visitors to the nests of ants and termites is very large, and has formed a considerable proportion of several previous lists, but the Doctor has eliminated this element from his paper so far as possible. This introduction is followed by a tabular statement of the number of myrmecophilous and termitophilous arthropoda mentioned in the body of the work, from which we make the following extracts:—

The entire number of myrmecophilous insects reaches 1,177 species, of which 993 are Coleoptera, under which the family Staphylinidæ is best represented with 263 species; the Paussidæ (none of which are North American) follow next with 169, then the Histeridæ with 128, the Pselaphidæ (s.s.) with 113, and the Clavigeridæ with 89. Several others hold from 15 to 40 species each of myrmecophilous habit, and in all 30 families are enumerated in this order. The Paussidæ and Clavigeridæ are, so far as known, almost exclusively myrmecophilous.

The Strepsiptera are represented by a single species of myrmecolax (*M. nietneri*, Westw.), which occurs in the hind body of ants in Ceylon. The Hymenoptera are found in 39 cases, of which 22 are other ants, and 14 belong to the parasitic families Braconidæ, Chalcididæ and Proctotruipidæ. There are 26 species of Lepidoptera, 18 Diptera, 7 Orthoptera, 1 Pseudoneuropter, 72 Rhynchota and 20 Thysanura. The Myriapoda are doubtful or more likely inimical and accidental. There are also 26 myrmecophilous spiders, 34 Acarina and 9 Isopodous Crustacea.

So much for myrmecophiles. The termites do not support such a large list of species, as 105 kinds of insects only are here recognized as

termitophilous. Of these, 87 are Coleoptera, distributed by families as follows:—Carabidæ, 5; Staphylinidæ, 59; Pselaphidæ, 5; Silphidæ, 1; Lathridiidæ, 1; Histeridæ, 7; Scarabæidæ, 6. The other orders of insects are not so well represented as the beetles, numbering thus:—Hymenoptera, 6; Lepidoptera, 2; Diptera, 2 (doubtful); Pseudoneuroptera, 4; Rhynchota, 3; Thysanura, 1. The Arachnoidea are present with 4 species.

After this presentation of the standing of different groups comes a bibliograpy of over 550 titles of books and papers containing more or less extensive notices of the inhabitants of ants' and termites' nests, and this is again succeeded by a list of species classified on a double system. Each family is taken up in order, and the species contained in it are arranged under different heads, as myrmecophilous or termitophilous. When the name of the host is known it is given, together with a reference to the source of information, and the author has inserted notes wherever they seemed necessary for the elucidation of difficult or disputed points. The list occupies nearly 150 pages, and is a marvel of careful study and long research.

Next in order is a supplement of 19 pages, containing descriptions of new species of these interesting little insects—among them several from the collections of Messrs. Schwarz and Pergande, who have done so much to advance our knowledge of North American forms. The work is closed by an alphabetical index, which admits of instant reference to any family or genus mentioned in the body of the book.

In conclusion, we must offer to Dr. Wasmann our sincere thanks and hearty congratulations on the completion of this comprehensive and valuable contribution to entomological literature. H. F. W.

DILIGENCE REWARDED.

Ever since Mr. Elliott disclosed the fact that *Platysamia Columbia* was to be found in this locality, a sharp lookout has been kept by the collectors here on the Tamarack trees, of which there are several clusters in this vicinity, for cocoons of that moth.

In the early part of December, 1894, Messrs. Balkwill and Rennie made the much looked for discovery, and in a short time had secured twelve, and on their next visit to the same locality, nine more; whilst they saw several that were well out of reach. They report them to be generally situated high up in the trees. On the smaller trees they are attached upright to the trunk, whilst on the larger ones, some were found on the branches, and seldom more than one on a tree. This is a good illustration of the advantage derived from knowing what to look for, and where to look for it, as they are far from being conspicuous objects.

J. Alston Moffat, London, Ont.

Mailed January 8th.

The Canadian Entomologist.

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THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

VII. THE CUCUJIDÆ OF ONTARIO AND QUEBEC.

The Cucujidæ constitute a small family of beetles of depressed, often elongate form, the antennæ lengthened in many species, giving them a somewhat characteristic appearance, which, while recalling the Cerambycidæ, renders them, nevertheless, easily recognized. They may be technically distinguished from the allied Clavicorn families by the long elytra, the five-jointed tarsi (the hind ones sometimes only four-jointed in the males), the rounded or oval anterior coxæ, the middle ones with externally open cavities and the posterior separate. The ventral segments are sub-equal in length. The larvæ, so far as known, are flattened grubs, with distinct antennæ and several ocelli; the terminal segments often with hooks or tubercles.

The table of genera, as given below, is entirely different from that used in the books, and is based on characters that can be easily seen by any one with the aid of a hand lens, but of course fails to express the real affinities, being made solely for the purpose of facilitating the work of identification of unknown species. Of the four figures given, three are taken from Captain Casey's "Revision of the N. Am. Cucujidæ," while that of *Cucujus clavipes* is original. The above-mentioned paper has proved very useful in the specific separation, and should be consulted by those who have to deal with extra-limital forms.

Seventeen species are recorded in the Canadian lists; they belong to eight genera, which separate thus:—

A. Antennæ with distinct club; third joint never longer, usually shorter than the second.

Club of three rather suddenly enlarged joints ..*Silvanus.*

Club of gradual formation .....*Nausibius.*

AA. Antennæ usually without club; third joint (with one exception) longer than the second.

b. Head widest behind the eyes; colour, bright red ... *Cucujus.*

bb. Head widest across the eyes.

c. Antennæ shorter than head and thorax..... *Pediacus.*

cc. Antennæ longer than head and thorax.

f. Thorax distinctly serrate at sides..... *Brontes.*

ff. Thorax not serrate at sides, sometimes with a single tooth at anterior angles.

g. First antennal joint about as long as the head ..... *Dendrophagus.*

gg. First joint much shorter than head.

Thorax as long or longer than broad, size usually large ..... *Catogenus.*

Thorax transverse, size small... *Læmophlœus.*

SILVANUS, Latr.

Small, usually elongate and somewhat depressed beetles of brownish or ferruginous colour, the elytra with large round punctures arranged in rows. Antennæ with the last three joints forming a rather abrupt and loose club. They are usually found in grain, which is often damaged considerably thereby, or under bark, more particularly that of oaks and poplars. The Canadian species may easily be known by the following characters: Fig. 1 represents *S. surinamensis.*

Prothorax sub-oval, sides each with six large teeth (.10 in.) ..... *surinamensis*, L.

Prothorax elongate, strongly narrowed behind, sides not toothed.

Body very opaque. Thorax longer and with a sharp tooth at anterior angles (.11 in.).. *bidentatus*, Fabr.

Body somewhat shining. Thorax wider, teeth at angles less developed (.10–.11 in.)..... *planatus*, Lec.

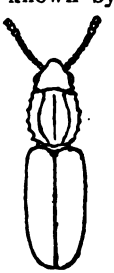

FIG. 1.

Prothorax broader than long, anterior angles with a small tooth (.075 in)..... *advena*, Waltl.

NAUSIBIUS, Redt.

One species (*N. dentatus*, Marsh.) is found here. It is larger than *Silvanus*, and the antennal club is of gradual formation. In

colour it is very dark brown, the body is densely and deeply punctured, and the sides of the prothorax are irregular, with six teeth. Length, .14 to .20 in.

CATOGENUS, Westw.

Represented by *C. rufus*, Fabr., a flat, chestnut-coloured insect, often taken under bark, and varying in size from a little over .15 to above .50 in. The prothorax is narrowed behind, distinctly punctured, but with a smooth median line. The elytra are deeply striate.

PEDIACUS, Shuck.

These are rather small, ferruginous or brownish insects of depresssed form, broader than most Silvanini, which they resemble somewhat in the antennæ being terminated by a three-jointed club. They are thus differentiated:—

Surface opaque, lateral thoracic margin feebly undulated (.12–.16 in.) ..... *fuscus*, Er.

Surface somewhat shining, lateral thoracic margin feebly serrulate (.12–.175 in.) ..... *depressus*, Hbst.

CUCUJUS, Fabr.

A very striking insect on account of its colour is *C. clavipes*, Fabr. (Fig. 2.) The entire upper surface is scarlet, except the eyes and antennæ. The head is broad behind the eyes, the posterior angles being produced outward and backward, and rounded at tips. The thorax and elytra are very flat, the former having the disk impressed. Tibiæ and tarsi, dark. Length, .40 to .50 in. The form known as *puniceus*, Mann., is found in British Columbia, and may be known by the first antennal joint being usually testaceous instead of black, the more elongate body and narrower neck.

FIG. 2.

LÆMOPHLŒUS, Lap.

Small, usually flattened, but sometimes moderately convex insects occurring commonly under bark. They are, as a rule, more flattened and often much broader proportionally than the Silvanini, the antennæ frequently elongate, especially in the males. The females, besides having shorter antennæ, have often a narrower head and thorax. The following table will enable the recorded species to be recognized:

A. Elytra with a light spot before the middle of each.
Elytral spot nearly circular, well defined, surface densely punctate (.10–.155 in.)..... .....*biguttatus*, Say.
Elytral spot ill-defined, irregular, surface lightly punctured (.10–.12 in.).....*fasciatus*, Melsh.
AA. Elytra uniformly ferruginous or testaceous or slightly darker at tip, not spotted.
Body flattened above.
Second antennal joint shorter than third (.07–.09 in.) ....*modestus*, Say.
Second antennal joint equal to third (.05–.08 in.)..*testaceus*, Fabr.
Body convex.
Anterior thoracic angles toothed (.08–.10 in.)..*convexulus*, Lec.
Anterior angles rounded (.056–.08 in.) .....*adustus*, Lec.

DENDROPHAGUS, Schönh.

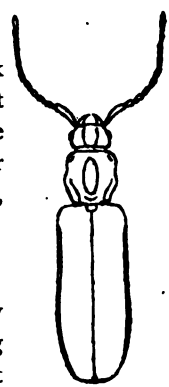
FIG. 3.

D. glaber, Lec. (Fig. 3), is a shining, nearly black species (the elytra sometimes brown), varying from about .25 to .28 in. in length, of depressed elongate form, the head and thorax with deep coarse punctures, the wider elytra being punctate-striate. The antennæ are long, the first joint about equal in length to the head.

BRONTES, Fabr.

FIG. 4.

Body very flat, closely and coarsely punctured, antennæ nearly or quite as long as the entire body, the first joint about equal to the next three. The sides of the thorax are minutely serrate and sinuate. But one species (*B. dubius*, Fabr., Fig. 4) is actually recorded from Canada, but as another is probably common there, I give Capt. Casey's table for their distinction:—

Elytra of male angulate posteriorly, head and thorax paler (.19–.23 in.).....*dubius*, Fabr.
Elytra evenly rounded behind in both sexes, body above unicolorous (.19–.21 in.) .....*debilis*, Lec.

The principal papers treating of the North American species of this small family are:—

1854. Leconte, J. L., Synopsis of the Cucuiides of the U. S. Proc. Acad. Nat. Sci., Phil., VII., p. 73–79.

1884. Casey, Thos. L., Revision of the Cucujidæ of America, north of Mexico. Trans. Am. Ent. Soc., XI., 1884, p. 69 to 112, pl. IV.–VIII.

SUMMARY OF THE U. S. PHASMIDÆ.

BY S. H. SCUDDER, CAMBRIDGE, MASS.

The following table, adapted from Brunner von Wattenwyl and Stal, will enable any one quickly to determine the genera in his collection of U. S. Phasmidæ. Our species are few in number and all apterous. Only one of them, *Diapheromera femorata* (Say), extends into Canada.

A¹. Tibiæ not furnished at apex beneath with a sunken areola to receive the base of the tarsi when bent upon them. (All of our genera of this division belong to the Bacunculidæ, in which the antennæ are much longer than the anterior femora and furnished with at least thirty joints, and the median segment is much shorter than the metanotum.)

b¹. Hind femora armed beneath on the median line near apex with one or more distinct spines..... *Diapheromera.*

b². Hind femora unarmed beneath next apex.

c¹. Head, especially in the ♀, furnished in front between the eyes with a pair of tubercles or longitudinal rugæ, sometimes highly developed; hind femora of ♀ hardly extending beyond the middle of the fourth abdominal segment, relatively stout; first joint of hind tarsi of ♀ shorter than the other joints together..... *Sermyle.*

c². Head unarmed in both sexes; hind femora of ♀ reaching the end of the fourth abdominal segment, relatively slender; first joint of hind tarsi of ♀ about equal to the other joints together..... *Bacunculus.*

A². Tibiæ furnished at apex beneath with a sunken areola to receive the base of the tarsi when bent upon them.

b¹. Antennæ many jointed, longer than the fore femora; median segment shorter than the metanotum; without spines on head, thorax or legs; anterior segments of abdomen transverse, at least in the ♀.

c^1. Mesothorax twice as long as the prothorax; basal joint of antennæ but little longer and little stouter than the second *Anisomorpha.*

c^2. Mesothorax no longer than prothorax; basal joint of antennæ fully twice as long and, especially on apical half, twice as stout as the second joint..... *Timema.*

b^2. Antennæ with less than twenty joints, shorter than the fore femora; anterior segments of abdomen much longer than broad *Bacillus.*

BACUNCULIDÆ.

Diapheromera, Gray.—The described species are *D. denticrus*, Stal, a large species found in the south-west (Louisiana and Texas); *D. femorata* (Say), of which *D. Sayi*, Gray, is a synonym, the commonest species and of the widest range, and *D. velii* Walsh, described from Nebraska. Apparently other species occur, but they have not been studied.

Sermyle Stal.—A species occurs in Texas, perhaps undescribed.

Bacunculus Burm.—Two species are found, one in Central Texas, the other in Southern Florida. Both are believed to be undescribed.

ANISOMORPHIDÆ.

Anisomorpha, Gray.—Three nominal species are known: *A. buprestoides* (Stoll'), *A. ferruginea* (Pal. de Beauv.) and *A. bivittata* (Say), all from the south-eastern and southern United States. Very likely there is only a single species (which must then take the name buprestoides), but *A. ferruginea* may be distinct from the others.

Timema (τίμημα) gen. nov.—This genus is closely allied to *Agathemera* Stal, but is readily distinguished by the somewhat remarkable antennae, the first joint of which is very large, much enlarged apically, though narrowed a little at the extreme apex, several times longer than broad, and two or three times larger than the eyes. The head is of equal width with the prothorax, which is not narrowed anteriorly. A single species from Santa Cruz, California, has been brought to my notice by Prof. L. Bruner. I propose to describe it as *T. californicum.*

BACILLIDÆ.

Bacillus Latr.—Two species have been briefly noted: *B. coloradus* Scudd., found in Colorado, and *B. carinatus*, Scudd., occuring in Arizona and northern Mexico.

ALYPIA MARIPOSA, LARVA.

BY HARRISON G. DYAR, NEW YORK.

Mr. J. B. Lembert has kindly sent me some alcoholic larvæ of *A. mariposa*, and I may record a few points in comparison with the eastern *A. octomaculata*. Mr. Lembert has given the life history quite fully in the December number of the CANADIAN ENTOMOLOGIST, but our species have not been compared. The larva is especially interesting, as being the second one discovered in this genus. We have long been familiar with that of *A. octomaculata*, and everybody has described it; but the other species, though somewhat numerous, have remained unknown.

Mr. Lembert has sent me specimens which appear to be in stages II., III., IV. and VI. The larvæ are noctuiform as is *octomaculata* with joint 12 enlarged. The tubercles are of the normal noctuid arrangement,* large, low-conical, rather less developed than in *octomaculata*, with single, large, smooth setæ. The width of head by calculation would be for the six stages—0.32, 0.50, 0.77, 1.2, 1.8, 2.8 mm. (ratio, 0.65). The measurements of the examples before me are 0.5, 0.75, 1.2 and 2.8 mm.

As compared with *octomaculata*, the markings are more generalized. Until the last stage, the larva is very plainly marked; besides the black tubercles, there is only present a diffuse white dorsal and stigmatal band, gradually becoming more distinct. In the last stage there are added four transverse black bands on each segment, instead of the eight of *octomaculata*, and these bands are confined to the space between the dorsal and stigmatal lines, and the two central ones on each segment are fused together. The abdominal leg plates are pale, instead of black, as in *octomaculata*. The ground colour is duller than in the eastern species. Instead of the bluish-white ground with the transverse orange bands on joints 5, 6, 7, and 12 of *octomaculata*, the whole ground is dull orange, relieved only by

* I., anterior subdorsal; II., posterior, more nearly lateral; III., lateral above spiracle; IV., stigmatal posterior; V., anterior, and VI., posterior inferior subventral; VII., three setæ in a triangle on leg plate; VIII., near medio-ventral line.

See article by Wilhelm Müller in Zool. Jahrbücher for 1886, on larvæ of South American Nymphalidæ. Tubercles VI. to VIII. do not appear characteristically on these specialized butterflies, and are not described by Müller.

the diffuse white longitudinal bands, which become obsolete anteriorly. The stigmatal band extends down below the spiracles and contrasts the black subventral tubercles. Its central part represents the intersegmental, sub-stigmatal white patches of *octomaculata*, though the marking is here quite undefined. Posteriorly the white bands tend to usurp the whole ground area, showing the origin of the white ground in *octomaculata*.

Nearly two years ago, Mr. Lembert sent me an egg of *A. mariposa* (or possibly *A. Ridingsii*). The following is its appearance under the microscope:—Flattened, round, strongly depressed centrally at the micropyle. Rather less than forty deep grooves run vertically, a few not reaching the summit; the edges of these grooves are somewhat sinuate, as if formed of rows of large pits which had become confluent in a vertical direction. In a rather large area around the micropyle, the grooves cease and are replaced by closely crowded punctures, but not small, with sharply elevated rims. Diameter, .7 mm. Height about .2 mm. Base flattened.

ACTIAS LUNA.

On 24th May Mr. Lachlan Gibb took a female, which he left alive to get eggs, a number of which were laid between the 25th and 29th. On the 14th June the eggs were hatching, and the larvæ were offered butternut leaves, which they eat readily, and matured very rapidly. About the 27th of the month, Mr. Gibb kindly gave me four of these larvæ, which were then apparently more than half grown. They moulted once only, so far as my observations went, after I received them, and on 12th July three spun their cocoons, the fourth doing this on the 16th. Early in August Mr. Gibb asked me to take charge of his cocoons, and keep them with mine, as giving a better opportunity of getting another lot of eggs next season, and on 20th August I was surprised to find that one of Mr. Gibb's cocoons had disclosed the imago, a ♀. Thinking that this was only the forerunner of others, I kept it alive, taking all the cocoons down with me to Murray Bay, but no other emergence took place.

Mr. Street, jr., of this city, has since informed me that he saw a specimen on our mountain at about the same time as this one emerged.

H. H. Lyman, Montreal.

CANADIAN COCCIDÆ.

I. THE SPECIES OF CHIONASPIS WHICH INFEST TREES OF THE TRIBE BETULEÆ.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

In 1869 Signoret described a species from Switzerland as *Chionaspis alni*. It was found on the bark of the alder *(Alnus communis)*. This species has never been seen in America, but in 1883 Comstock announced a form from alder and *Viburnum* as *Chionaspis Lintneri*. Since the latter date our knowledge of the matter seems to have remained without additions. Mr. James Fletcher has just sent me a *Chionaspis* plentifully infesting the bark of *Betula papyrifera*, from Charlottetown, Prince Edward Island, about 46° N. Lat. I examined this with interest, owing to the locality and the host plant, and on comparing it with Comstock's account of *C. Lintneri*, I have no doubt that it is the same.

The following description was made from the Charlottetown specimens :—

♀ scale white, with the exuviæ rather small, orange-brown. Scale very broadly pyriform in outline, some nearly circular without the projection on which are the exuviæ. Length of scale about 2 mm.

♀ (soaked, not boiled, in liquor potassæ) pale lemon-yellow. Mouth parts large. Ventral grouped glands well-developed, caudolaterals 31, cephalolaterals 38, median group with 18 orifices. A group of nine to fifteen oval dorsal pores situated nearly opposite the lateral groups of ventral glands. Bands of dorsal oval gland-orifices very distinct. The usual sac-like bodies between the lobes. Anal orifice between the cephalolateral groups of glands.

Median lobes large, rounded at their ends, but not truncate; their two sides, if continued to a point, would meet at a little less than a right angle. Lobes touching at base, thence widely diverging at about a right angle; not distinctly notched.

Second lobes shorter, rounded, with a small appendage or lobule placed cephalad.

Third lobes rounded, low, forming less than a hemisphere, with a small lobule placed caudad.

Margin beyond the lobes irregularly crenate, slightly serrate.

Spine-like plates as in allied species, two between first and second

lobes, three between second and third, next a large pair, then another larger pair, and then a group of five to nine. These characters are quite variable.

Comparing the above with Comstock's account of *Lintneri*, one or two points call for notice. Comstock says he found the ♀ reddish-brown, with the last segment yellow, but supposes in life it would be reddish. This I doubt, but my specimens are not alive, so I cannot say certainly what colour they originally were. In his table of *Chionaspis* (2nd Cornell Rep., p. 98) he separates *Lintneri* from *salicis* by two characters:—

(1.) *Distal ends of mesal lobes pointed or obscurely trilobed.*
They are not exactly pointed, and the trilobation is very obscure, but the distinction intended seems a valid one.
In *salicis* these lobes are more truncate altogether.

(2.) *A single plate laterad of each second lobe, and usually two plates laterad of each third lobe.*
This appears to break down altogether; the first specimen I examined was as above described, with two and three plates; but the character was not constant, the next one looked at being as typical *Lintneri*.

On comparing the Charlottetown scales with scales of *C. salicis* received from Mr. Newstead, I found that they were practically alike. Comstock says he cannot tell the scales of *Lintneri* (♀) from *salicis*,—neither can I.

If Comstock had not described *Lintneri*, I think I should have placed the Charlottetown insect, for the present, as *C. salicis*, var.; but although it is extremely near to *salicis*, it must be admitted that it is not really the same, and the name *C. Lintneri* stands valid.

Fortunately I had some scales of *C. alni*, Sign., sent to me by Mr. K. Sulc, collected at Kralové Dvur, Bohemia. On comparing them with the Charlottetown *Lintneri*, they were manifestly distinct, being narrower, not so white, with paler exuviæ. They were from *Alnus glutinosa*.

It may not be out of place here to call attention to *Aspidiotus betulæ*, Baren sp., 1849, which is listed in Prof. Smith's New Jersey Catalogue. It is a pretty and distinct species, but I have seen only European specimens.

II. PRELIMINARY NOTE ON THE SPECIES OF LECANIUM FOUND ON OAK IN NORTH AMERICA, WITH ESPECIAL REFERENCE TO ONE ON QUERCUS RUBRA.

Some time ago Mr. James Fletcher sent me specimens of a *Lecanium* found at Jubilee Point, Rice Lake, Canada, on *Quercus rubra*. This was handed to Mr. J. Bennett for examination, and was found by him to present the following characters :—

Scale, 4 mm. long, 2½ wide, 2 high. Antennæ 7-jointed, formula 3 (2 1) 7 5 4 6. 7 was almost as long as 2. Tarsus, ⅔ length of tibia; claw short and not very sharp.

There are four species of *Lecanium* known from oaks in North America, the characters of which, according to Signoret, are as follows (excluding non-essential details) :—

L. antennatum, Sign. — Scale, 5 mm. long, 3½ wide, 3 high. Antennæ 7-jointed, 3 very long, 7 longer than 4, 5 or 6, which are short. Tarsus a little longer than tibia, claw stout. Distinguished from *quercitronis* by its more elongate form.

L. quercitronis, Fitch.—Scale, 3 to 5 mm. long, 3 to 4 wide, hemispherical, somewhat elongate in lateral profile. Antennæ 7-jointed, 3 and 4 longest, nearly equal, 5 and 6 shortest, 7 as long as 4. Tibia longer than tarsus; claw very small. On black oak.

L. quercifex, Fitch.—Scale, 7 mm. long, 4 wide, 4 high. Antennæ 7-jointed, 3 and 4 equal, 5 and 6 equal and shortest, 7 as long as 5 + 6. Tarsus as long as tibia. On white oak.

L. quercus (Linné?), Sign.—Scale, 7 mm. long, 3½ wide, 3½ high. Antennæ not seen by Signoret. Tarsus not quite so long as tibia. More rugose than *quercifex*, but less so than *antennatum*. This can hardly be the true Linnean insect.

In Europe are found on oaks:

L. emerici, Planch.—On the "evergreen oaks" in South Europe.

L. fuscum, Gmel.—On *Quercus robur*; scale, 6 mm. diam.; antennæ 6-jointed, 3 much longer than 4. See Douglas, Ent. Mo. Mag., Oct., 1887, p. 98.

L. ciliatum, Dougl.—In England. See Ent. Mo. Mag., 1891, p. 67.

? *L. quercus*, Linn.—On *Quercus robur*. See Douglas, Ent. Mo. Mag., Oct., 1887, p. 99. These four names appear to represent only three recognizable species.

Putting aside the European forms, which do not appear to occur in America, we have two elongate species and two short ones. Our scale on *Q. rubra* evidently belongs with the latter. The main distinction between *antennatum* and *quercitronis* is in the antennæ, and here we see at once that our form falls in with the former, having the third joint very much longer than 4. There would seem, however, to be a slight difference in the legs.

On the whole, the evidence so far obtained cannot be said to support the view that the Canadian insect is new, and distinct from *antennatum*, though it may stand as a variety. For the present it can be recorded as *Lecanium antennatum*, Signoret, variety.

PROTECTIVE MIMICRY IN SPIDERS.

BY F. M. WEBSTER, WOOSTER, O.

In the concluding volume of his admirable work on "American Spiders and their Spinning Work," page 47, Dr. McCook gives the experiences of Mr. H. O. Forbes, and myself, with two species of spiders, whose forms and habits of spinning webs on leaves, together with the peculiar coloration of their bodies, gives them a deceptive resemblance to the droppings of birds. Dr. McCook tries to account for the phenomena of this protective resemblance, by attributing it to the results of natural selection.

Now, it seems to me that natural selection, alone, would not have carried the deception so far as seems to have been done in these cases, and I think, away from their curiously arranged web, these spiders are not so deceptive in appearance, and that the spider has itself learned that by remaining in a rigid position on a sheet of web, arranged in a certain way on the leaf, it will be enabled to escape its enemies, and, what may be of almost as much importance, secure a better supply of food.

To suppose this is hardly over-estimating the intelligence of these spiders. In my own case, I have thought that the deception might have been due, in part at least, to myself, and have often thought that on meeting with it a second time I should recognize it without much trouble.

The Doctor has apparently overlooked the fact that Mr. Forbes

met with his spider a second time, and was even more badly fooled by it than before. In Proc. Zool. Soc., 1883, p. 586, he gives his experience as follows:—

"On June 25th, 1881, in the forest near the village of Lempar, on the banks of the Moesi River, in Sumatra, while my "boys" were procuring for me some botanical specimens from a high tree, I was rather dreamily looking on the shrubs before me, when I became conscious of my eyes resting on a bird-excreta-marked leaf. How strange, I thought, it is that I have never got another specimen of that curious spider I found in Java which simulated a patch just like this. I plucked the leaf by the petiole while so cogitating, and looked at it half listlessly for some moments, mentally remarking how closely that other spider had copied nature; when to my delighted surprise, I discovered I had actually secured a second specimen, but the imitation was so exquisite that I really did not perceive how matters stood for some moments. The spider never moved while I was plucking or twirling the leaf, and it was only when I placed the tip of my finger on it, that I observed that it was a spider, when it, without any displacement of itself, flashed its falces into my flesh.

"The first specimen I got was in West Java. While hunting one day for lepidoptera I observed a specimen of one of the Hesperidæ sitting, as is often a custom of theirs, on the excreta of a bird on a leaf; I crept near it, intending to examine what they find in what one is inclined to consider incongruous food for a butterfly. I approached nearer and nearer, and at last caught it between my fingers, when I found that it had, as I thought, become glued by its feet to the mass; but on pulling gently, the spider, to my amazement, disclosed itself by letting go its hold. Only then did I discover that I was not looking on a veritable bird's excreta."

Since reading of Mr. Forbes's later experience I have given myself no mental promises as to how readily I should be able to recognize Madam *Misumena vatia* (?) when I next meet her unexpectedly. Unless greatly mistaken, I have beaten this same spider from branches of trees while collecting beetles, and experienced no difficulty in recognizing its nature as it dropped into an inverted umbrella, and am quite sure that, without the white web on the leaf, which resembles the white splashings of the semi-fluid excreta, it would be far less deceptive.

PREPTOS, TAMPHANA AND AROTROS—A REVIEW.

In the Proceedings of the Zoological Society of London for 1892, Mr. W. Schaus describes as new 180 species of "Bombycid" moths from Mexico and various parts of South America, with three "new genera." Of these, one is located in the Lasiocampidæ and two in the Bombycidæ. All these generic descriptions are utterly inadequate, and the question should be raised seriously whether names founded on such descriptions should be recognized. We are accustomed to believe that the classification of Herrich-Schaffer is still used by lepidopterists, at least in its fundamental features; but in these descriptions the word "vein" does not appear. The description of the Lasiocampid is the longest of the three, yet the author gives but eight characters by which to identify his genus. Five of these are common to nearly all the genera of the family; two others appear in several genera already well known, and the genus must be distinguished from the one hundred and forty odd genera of Lasiocampidæ already catalogued, by the female having an expanse of wing of 95 mm., and a short abdomen, "not extending beyond the secondaries!"

Surely it is time to call a halt. Some standard of generic description must be adopted, or else what is the use of multiplicating so-called "descriptions" that do not describe. Better to save puzzling over meaningless sentences, and simply say:—"New genus; type in my collection."

It would seem that the least that could be expected of an author was to tell how the venation differed from the nearest ally of the "new genus," the same being already described. A full description of the venation, or a figure, would be preferable. Even a complete knowledge of the wing structure is not sufficient to place a genus; but it is among the essentials.

I think all who have had anything to do with generic characters (which, unfortunately, does not seem to be a majority of lepidopterists!) will agree with me that the practices to which I am referring are reprehensible, and deserving of a most vigorous protest.

HARRISON G. DYAR.

ON THE COLEOPTERA OF NEW MEXICO AND ARIZONA, INCLUDING BIOLOGIC AND OTHER NOTES.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

A paper giving biologic notes on some New Mexico Coleoptera was published in "Insect Life," Vol. V., p. 37–40; and a paper treating of the blister-beetles or meloids of New Mexico and Arizona, in "Psyche," 1894, p. 100–102. The species mentioned in the former are mostly incorporated in the present paper, those in the latter not at all. These three papers, therefore, will serve as a catalogue, or list with notes, of all the Coleoptera observed by the writer in New Mexico and Arizona, except a few, the names of which it has been impossible to get from those to whom they were sent for determination.

I will not attempt to point out here any peculiarities in the Coleopterous fauna of this region, but let the list speak for itself. The absence, scarcity, and abundance of certain families and groups are interesting, and characteristic as a rule, though I cannot say that the list represents the true proportions, as my collecting was far too meagre.

All the species were determined by Dr. Riley, with the exception of those marked *, which were determined by Mr. Liebeck.

Tetracha Carolina, L.—Las Cruces, N. M. August 21st to Sept. 10th; seven. Grant County, N. M. (W. J. Howard); one.

Cicindela obsoleta, Say.—Grant Co., N. M. (W. J. H.); one. It is 19 mm. long, brownish black, with four creamy markings on each elytron, the inner or fourth one small, resulting from the breaking of the median large one into two.

Cicindela prasina, Lec.—Grant Co., N. M. (W. J. H.); one. It is 17 mm. long, bright vivid green, with six spots on each elytron, the three principal markings each broken into two.

Cicindela longilabris, Say.—San Francisco Mountain, Arizona, July 15th; one. Much like a large specimen of *vulgaris*, but with elytral markings very delicate, indistinct. *

Cicindela pulchra, Say.—Navajo Springs, Arizona, July 24th; ten specimens. Grant County, N. M. (W. J. H.); two large specimens.

Cicindela punctulata, Fab.—Navajo Springs, Arizona, July 24th; one. Grant County, N. M. (W. J. H.); one.

Cicindela micans, Fab.—Las Cruces, N. Mex.; one. Zuni, N. M., July 29th; one. Grant Co., N. M. (W. J. H.); one. Green species.

Cicindela macra, Lec.—Las Cruces, N. M.; four.

Cicindela sperata, Lec.—Winslow, Arizona, July 19th; one. Aztec, Arizona, July 21st; two. Navajo Springs, Arizona, July 24th; five.

Cicindela, sp. indet.—Grand Canon, Arizona. Hance trail; 2,500 to 5,000 ft. below rim. July 8th to 11th; twenty-seven collected. *

Calosoma scrutator, Fab.—Las Cruces, N. M., May 17th, 1892; one. Palomos, N. M., June 15th, 1892; one seen to drop from a cottonwood tree, on which it had doubtless been hunting and devouring *Hemileuca* larvæ that were present on the tree. Another on a tree, and still another taken on ground at a spring. Grant County, N. Mex. (W. J. H.); one.

Calosoma peregrinator, Guér.—Grant County, N. M. (W. J. H.); one. Blackish.

Pasimachus obsoletus Lec.—Grant County, N. M. (W. J. H.); one.

Pterostichus scitulus, Lec.—Zuni, N. M., July 29th, 1892. A green species; one.

Harpalus caliginosus, Fab.—Grant Co., N. M. (W. J. H.); two.

Cymbiodyta fraterculus (? Lec.—? Ilybius).—Soledad Canon, Organ Mountains, N. M. In a north side branch, about two miles up. May 23rd, 1891; one. In same spring with following. A smaller black water-beetle.

Rhantus atricolor, Aubé.—Soledad Canon, Organ Mountains, N. M. Same north side branch, about two miles up. May 23rd, 1891. Numerous specimens (11) taken from a spring full of dead leaves.

Hydrophilus triangularis, Say.—Las Cruces, N. M.; one.

Hydrocharis glaucus, Lec.—Grand Canon, Arizona. Hance trail. July 8th, 1892; one. An oblong-hemispherical black water-beetle, taken in stream. *

Necrophorus guttula, Mots.—Johnson's Basin, Socorro Co., N. M.; one. June 23rd. Black and orange.

Megilla vittigera, Mann.—G. Bar Ranch, Zuni River, Arizona. July 27th, 1892; three. *

Hippodamia sinuata, Muls.—Colorado, N. M., June 14th, 1892; one.

Coccinella oculata, Fab., and var. *abdominalis*, Say.—Las Cruces, N. M. May 22nd, 1892. Many pupæ found on black locust at Central Hotel in Placita. On June 13th, 1892, both the species and the variety were found on mesquite *(P. juliflora)* on road between Detroit and Rincon, N. M., and a great many larvæ were also seen on the mesquite.

Mysia Hornii, Cr.—Turkey Tanks, Arizona, July 1st; one.

Chilocorus, sp. ?—Las Cruces, N. M., July 16th, 1891. Found empty larval skins of a coccinellid on trunks of apple trees. They were in patches of as many as twenty in places, usually just beneath where a large limb branched out from the trunk.

Hyperaspidius trimaculatus, L.—Las Cruces, N. M.

Epilachna corrupta, Muls.—Las Cruces, N. M. Very injurious to beans. (See Insect Life, IV., 26.)

Erotylus Boisduvalii, Chev.—Grant County, N. M. (W. J. H.); one. This is a peculiar beetle, wholly black except the elytra, which are pale yellowish-white, with scattered, very small, shot-like black dots and a little black on outer edge in middle of each elytron.

Dermestes marmoratus, Say.—Chaves, N. M. Aug. 6th, 1892; one.

Attagenus Hornii, Jayne.—Las Cruces, N. M.; one beaten from mesquite *(P. juliflora)*, May 12th, 1891. On mesa.

Trogoderma tarsale, Melsh.—Las Cruces, N. M. Found May 9th, in spring mattress of a bed, in some numbers. It was a hair mattress, and the beetles doubtless bred in it.

Anthrenus varius, F.—Las Cruces, N. M. One beaten from flowers of mesquite *(P. juliflora)*, May 10th, 1891. On mesa.

Hololepta populnea, Lec.—Las Cruces, N. M., Nov. 14th, 1892. Found under bark of cottonwood log, in wet black inner layers of decaying bark, numbers of adults of this flattened histerid. They were infested with mites. Pupæ of this species were found under cottonwood bark, November 16th and 17th, 1892, in Alameda and *Bosque vedado*. They were enclosed each in a little cell in the inner layers of bark, the cell opening against the sap-wood. The cell is formed of pieces of the inner bark, and is placed between the inmost layers of bark and the sap-wood, being attached to the

former. The pupa is wide, flattened, tapering rather shortly behind, and is slightly hairy anteriorly, with a pair of short anal styles posteriorly. It was bred to the imago state.

Hister Ulkei, Horn.—Zuni, N. M., July 29th, 1892. A black and red histerid.

Paromalus estriatus, Lec.—Las Cruces, N. M., Nov. 14th, 1892. Found under bark of cottonwood, in the wet black inner layers.

Saprinus discoidalis, Lec.—Winslow, Arizona, June 29th, 1892. A greenish-black histerid.

Carpophilus hemipterus, Linn.—Las Cruces, N. M., April, 1892. Found in ensilage by Samuel Steel, in company with some staphylinids. The ensilage was stored the previous summer, and kept tight all winter, so that the beetles had no access except from the adjoining earth. It was covered several feet deep with earth.

Carpophilus pallipennis, Say.—Las Cruces, N. M., May 18th, 1892. Numerous specimens found in yellow flowers of an *Opuntia*, sp., on Tortuga Mt. A dark, reddish-brown species, with elytra yellowish, except at inner basis.

Hesperobænus, n. sp.—Soledad Canon, Organ Mts., N. M. Eating newly-forming flowers of *Dasylirion Wheeleri*. (See Insect Life, V., 38, where it was referred to *Rhizophagus.)*

Sandalus porosus, Lec.—Zuni, N. M., July 31st, 1892; one.

Adelocera rorulenta, Lec.— Hart Little Spring, Arizona, July 4th, 1892; one. A most beautiful brown, bronze-yellow-dusted species.*

Chalcolepidius Webbii, Lec.—Grant County, N. M. (W. J. H.); two.

Alaus lusciosus, Hope.—Las Cruces, N. M., May 26th, 1892; one. Greatly resembles *oculatus*.

Melanotus, sp.—Grant County, N. M. (W. J. H.); one.

Gyascutus planicosta, Lec.—Grand Canon, Arizona. Hance trail. 3,000–4,000 feet below rim. July 10th, 1892; one. Also common at Las Cruces, N. M., on larrea and mesquite. (See Insect Life, V., 38.)*

Gyascutus carolinensis, Horn.—Grand Canon, Arizona. Hance trail. 3,000–4,000 feet below rim. July 11th, 1892. A bronzed species, but smaller than *planicosta*.*

Psiloptera Webbii, Lec.—Las Cruces, N. M., August 19th, 1892. Found six of this large purplish-blue metallic buprestid, with brassy yellow spots, on *Salix longifolia* in the Alameda. It seemed to be eating the leaves. On August 21st many more were found on the same *Salix* in other localities along the *Acequia madre*. One was found also Nov. 14th, 1892, on same *Salix* in Alameda. The beetle is common, but I have never found it on anything else except this *Salix*. Grant County, N. M. (W. J. H.); one.*

Buprestis Nuttalli, Kirby.—Grant County, N. M. (W. J. H.); one. This beautiful species is blackish, with a slight greenish lustre, elytra each with three yellow marks in a longitudinal line near centre, the two posterior ones on the right elytron coalescing by a narrow neck.

Buprestis maculiventris, Say.—Grant County, N. M. (W. J. H.); one. A blackish species.

Melanophila miranda, Lec.—Grant County, N. M. (W. J. H.); two. A beautiful black and yellow species.

Chrysobothris carinipennis, Lec.—Flagstaff, Arizona, July 3rd and 16th, 1892; two.

Chrysobothris debilis, Lec.—Las Cruces, N. M., May 13. A pair *in coitu*.*

Chrysobothris, n. sp.—Woodruff, Arizona, June 26th, 1892. A single specimen of a beautiful and most vivid metallic green species.

Thrincopyge alacris, Lec.—Las Cruces, N. M. Bred from dead flower-stalks of *Dasylirion Wheeleri*. (See Insect Life, V., 38, where the species is queried.) June 1st, 1892. One more issued from the flower-stalks grathered May 18th, 1892. Another issued June 6th, 1892.

Thrincopyge ambiens, Lec.—Las Cruces, N. M. Bred from *Dasylirion Wheeleri* flower-stalks of previous year. August 11th, 1892, after returning from a two-months' field trip, four of the beetles were found dead in the breeding cages. The species is about the size of *T. alacris*, but is deep metallic green with a yellowish border. *

Acmaeodera mima, Gory.—Soledad Canon, Organ Mts., N. M., May 23rd, 1891; one on thistle. Looks much like *A. pulchella*.

Acmaeodera pulchella, Hbst.—Soledad Canon, Organ Mts., N. M., May 23rd, 1891; one on thistle flower.

Acmaeodera culta, Web.—Las Cruces, N. M., August 11th, 1892. A dead specimen found issued from dry flower stalks of *Dasylirion Wheeleri.* August 18th another had issued. *

Lygistopterus rubripennis, Lec.—Flagstaff, Arizona, July 2nd and 3rd, 1892; two.

Pyropyga fenestralis, Melsh.—Grand Canon, Arizona. Hance trail July 10th, 1892; one. A small blackish lampyrid, with thorax. red on sides.*

Chauliognathus basalis, Lec.—Grant County, N. M. (W. J. H.); two.

Chauliognathus scutellaris, Lec.—Las Cruces, N. M., August 19th; one.

Collops bipunctatus, Say.—Grand Canon, Arizona. Plateau on rim at Hance's. July 7th, 1892. Blue-green, thorax fulvous with two black spots; head black at base, including eyes, fulvous anteriorly and antennæ fulvous with great enlargement of third joint.*

Pristoscelis rufipes, Mots.—Las Cruces, N. M. Several beaten from flowers and foliage of mesquite *(P. juliflora)*, May 10th, 1891. On mesa. Another beaten from same plant three miles south of Mesilla, May 16th, 1891. This is a very small pubescent elongate beetle. It is smaller, blacker and not so pubescent as *P. suturalis.*

Pristoscelis suturalis, Lec.—Las Cruces, N. M. Several beaten from mesquite *(P. juliflora)*, May 16th, 1891, three miles south of Mesilla. A small pubescent beetle.

Cymatodera Belfragei, Horn.—Chaves, N. M., August 6th, 1892; one. Elongate, blackish species.

Trichodes ornatus, Say.—Hart Little Spring, Arizona, July 4th, 1892; two. Grant County, N. M. (W. J. H.); five. *

Clerus spinolæ, Lec.—Las Cruces, N. M. (?).

Hydnocera tricondylæ, Lec.—Cocanini Plateau, Arizona, July 6th, 1892; one.

Lucanus mazama, Lec.—Grant County, N. M. (W. J. H.); one ♀.

Platycerus oregonensis, Westw.—Hart Little Spring, Arizona, July 14th, 1892; three.*

Phanæus quadridens, Say.—Grant County, N. M. (W. J. H.); one ♂. This species is same size as *difformis*, but dark green without

bronzy lustre, and elytra smooth. The strong backwardly curved horn on head of ♂ reaches back nearly to base of elytra.

Phanæus difformis, Lec.—Grant County, N. M. (W. J. H.); 2 ♂'s and 1 ♀.

Atænius laeviventris, Horn.—Las Cruces, N. M. Flying in summer.

Aphodius granarius, Linn.—Santa Fé, N. M., April 20th, 1892. Mr. J. F. Wielandy sent this species, reporting it to be doing extensive damage to his hot beds by issuing in immense numbers from the compost in the beds, thus throwing out the newly-sprouted seedlings, roots and all. Destroyed three-fourths of his young plants. He reports that "thousands upon thousands" issued. The layer of compost consisted of old rotten manure mixed with earth, and was put on top of the beds. Beneath this was a three-foot layer of fresh dung to furnish heat. The injury was done by the mere mechanical force of the issuing of the insects.

Ochodæus striatus, Lec.—Winslow, Arizona, July 19th, 1892; one. A small pale rufous scarab.

Macrodactylus uniformis, Horn.—Near Rincon, N. M., June 13th, 1892; one. On mesquite or weeds.

Diplotaxis brevicollis, Lec.—Apache Spring, Socorro County, N. M., June 21st, 1892; one. Black species.*

Diplotaxis truncatula, Lec.?—Rincon, N. M., June 14th, 1892; one. Blackish species.*

Diplotaxis Haydenii, Lec.?—Rincon, N. M., June 13th, 1892; one. Rufous brown species.*

Listrochelus disparilis, Horn.—Continental Divide, Tenaja, N. M., August 1st, 1892; six specimens, attracted to light of camp fire at night.*

Listrochelus scoparius, Lec.—Continental Divide, Tenaja, N. M., August 1st, 1892; six specimens, attracted to light of camp fire at night Flagstaff, Arizona, July 3rd, 1892; one. *

Polyphylla 10-lineata, Say.—Flagstaff, Arizona. A 1 Ranch, Arizona Cattle Co., July 15th, 1892; one. Attracted to light in evening. A gray-brown scarab, conspicuously striped with whitish.

Plusiotis gloriosa, Lec.—Grant County, N. M. (W. J. H.); three.

Cyclocephala immaculata, Oliv.—Las Cruces, N. M. Attracted in numbers to light in houses in evenings in summer. A pale coloured chafer.*

Ligyrus gibbosus, DeG.—Las Cruces, N. M. Attracted to light.*

Ligyrus ruginasus, Lec.—Grant County, N. M. (W. J. H.); one. Light yellowish-rufous in colour.

Xyloryctes satyrus, Fab.—Grant Co., N. M. (W. J. H.); one ♀.

Strategus julianus, Burm.—Grant Co., N. M. (W. J. H.); a pair, ♂ ♀.

Dynastes tityus, Linn.—Grant County, N. M. (W. J. H.); one ♂. This species may be known by the lower or cephalic horn having two prongs at the end, and by the short stout spine at lower base of thoracic horn. Length to tip of horns, over 60 mm.; width, 26 mm.

Dynastes Grantii, Horn.—Grant County, N. M. (W. J. H.); one ♂. But slightly smaller than *D. tityus*, the lower or cephalic horn shorter and simple at end, and no spine at base of thoracic horn.

Allorhina mutabilis, Gory—Grant County, N. M. (W. J. H.); Las Cruces, N. M. In some specimens the green is restricted to the inner basal portion of each elytron.

Gymnetis, sp.—Grant County, N. M. (W. J. H.); one. A soft black cetoniid, with hardly a greenish shade except below.

Euphoria Kernii, Hald.—Las Cruces, N. M., June 28th, 1891. There are two forms of this species. Six were taken of the beautiful yellowish or flavous, and three of the blackish with creamy markings on elytra; all flying about over ground in sandy and bear spot near sheds at College.

Euphoria inda, Linn.—Grant County, N. M. (W. J. H.); one.

Cremastochilus crinitus, Lec.—Grant County, N. M. (W. J. H.); one. Wholly brownish-black.

Derobrachus geminatus, Lec.—Las Cruces, N. M. A female specimen taken is 83 mm. long by 26 mm. broad. This is a giant prionid. A male specimen was taken August 22nd, which was 54 mm. long by 16½ mm. broad. It is elongate, narrowed and shining brown.

Prionus californicus, Mots.—Las Cruces, N. M. A female specimen is 53 mm. long by 23 mm. broad. Antennæ are not stout in this sex. Another female taken by W. J. Howard in Grant County (1882) is 40 mm. long by 17 mm. broad. A male, with

heavy serrate antennæ, was taken in Holbrook, Arizona, June 26th. Another male was taken by Mr. W. J. Howard, in Grant County. It measures 38 mm. long by 15 mm. broad.

Criocephalus productus, Lec.—Cedar Ranch, Arizona, July 6th; one. Blackish in colour.

Rhomaleum simplicicolle, Hald.—Grant County, N. M. (W. J. H.); two.

Dendrobias quadrimaculatus, Dup.—Las Cruces, N. M. The male has long clasp-like mandibles. But some males also occur which are smaller, and have smaller clasp-like mandibles. Two on *Prosopis juliflora*, June 25th, ♂ ♀, but taken separately. Seven on *Sphæralcea angustifolia*, June 30th, one pair being *in coitu*. One on willow (*Salix*), July 16th.

Stenaspis verticalis, Serv.—Las Cruces, N. M., June 28th; one. On *Prosopis juliflora*. This species differs from *S. solitaria* by the thorax being reddish or brownish-yellow. A specimen taken on same plant June 29th, Las Cruces, N. M., has also the front half of elytra more or less reddish, like the thorax.

Stenaspis solitaria, Say.—Las Cruces, N. M., June 28th, 1891. One of this very large, elongate, pure black longicorn on mesquite (*P. juliflora*). June 29th, 1891. Another on same plant.*

Tragidion annulatum, Lec.—Grant County, N. M. (W. J. H.); one. The antennæ are shorter and stouter than in *T. fulvipenne*, and yellow on median portion.

Tragidion fulvipenne, Say.—Winslow, Arizona, June 29th; one. On plant No. 261, N. M. Agricultural College Herbarium. A black species, with elytra orange-yellow except at bases.

Aethecerus latecinctus, Horn.—Mesilla, N. M., May 16th. On mesquite. Beaten from flowers of *P. juliflora*, three miles south of Mesilla. It much resembles a *Neoclytus*.

Batyle suturalis, Say.—Las Cruces, N. M.; three.*

Schizax senex, Lec.—Las Cruces, N. M., March 27th; one. On mesquite (*P. juliflora*); on a twig.

Tylosis maculata, Lec.—Sabinal, N. M., August 7th. One specimen having two black spots at base of each elytron, and a larger one near tip. One from Grant County, N. M. (W. J. H., 1882),

has the spot near tip of elytron very large, and also another intermediate one same size. Another from same source lacks the spot near tip; while still another lacks also the middle or intermediate spot, thus having only the two spots at base of each elytron. The species is orange-red, with head, antennæ and legs black, and with five black spots on proscutum.

Crossidius intermedius, Ulke.—Las Cruces, N. M. Common on a yellow-flowering weed (*Solidago* sp. ?).

Stenosphenus debilis, Horn.—Grand Canon, Arizona. Hance trail; 3,000–4,000 feet below rim. July 11th, 1892; one. A small elongate blackish longicorn.*

Neoclytus irroratus, Lec.—Grant County, N. M. (W. J. H.); one. Rather stout, with rounded prothorax, and femora thickened apically; soft brown in colour, faintly whitish on elytra.

Rhagium lineatum, Oliv.—Grant County, N. M. (W. J. H., 1882); one.

Acmaeops pratensis, Laich.—San Francisco Mt., Arizona, July 15th, 1892; one. A small short lepturian, with pale yellowish elytra, having a dark vitta on each from shoulder to a point two-thirds of the way to tip.*

Pachyta liturata, Kirby.—Grant County, N. M. (W. J. H.); one. A rather broad lepturian, blackish in colour except elytra, which are pale yellowish, each with broad longitudinal brown vitta but little narrower than the elytron.

Leptura propinqua, Bland.—Hart Little Spring, Arizona, July 14th, 1892; one. An elongate black lepturian. Elytra straw-coloured, with one black spot in middle on outside, tips black, and a very faint black spot outside anteriorly.*

Leptura convexa, Lec.—San Francisco Mt., Arizona, July 15th, 1892; one large and two smaller ones. Hart Little Spring, Arizona, July 14th; one.*

Leptura aspera, Lec.—Grant County, N. M. (W. J. H). The number of this specimen was lost, but I am quite sure the locality is Grant County. It is a uniformly opaque black species.

Monohammus titillator, Fab.—Flagstaff, Arizona, July 2nd; one.

Tetraopes femoratus, Lec.—Seneca Ranch, Apache County, Arizona, June 25th, 1892; six specimens on a large broad-leaved *Asclepias*.* Grant County, N. M. (W. J. H.); one.

Coscinoptera axillaris, Lec.—Las Cruces, N. M.; one. This is a gray species with red on the outer base of elytra.

Cryptocephalus leucomelas, Suffr.—Grand Canon, Arizona. Hance trail. July 11th, 1892; one. A yellow and rufous brown species.*

Cryptocephalus, sp.—Las Cruces, N. M., May 16th, 1891. Three specimens, two *in coitu*, on growing stalks of a *Solidago*, three miles south of Mesilla. This is a species of a beautiful clear yellow colour. It could not be specifically determined either in Washington or Philadelphia, a specimen having been sent both to Dr. Riley and to Mr. Liebeck.

Cryptocephalus, sp.—Hart Little Spring, Arizona, July 4th, 1892; one.*

Chrysochus auratus, Fab.—Las Cruces, N. M., August 19th; two.

Doryphora rubiginosa, Rog.—Grant County, N. M. (W. J. H.); three. A tawny species.

Chrysomela dislocata, Rog.—Las Cruces, N. M., June 29th to 30th. On *Sphaeralcea (Malvastrum) angustifolia*. (See Insect Life, V., p. 39.)*

Chrysomela serpentina, Rog.—Las Cruces, N. M. Last of June. On *Sphaeralcea angustifolia*.*

Chrysomela sylvia, Stal.—Grant County, N. M. (W. J. H.); three.

Diabrotica vittata, Fab.—Las Cruces, N. M., July 8th, 1891. In small numbers on squashes on College farm. Eddy, N. M., August 14th, 1891. From F. E. Downs.

Galeruca (Trirhabda ?) nitidicollis, Lec.—Squaw Spring (south of Navajo Springs), Arizona, July 24th, 1892. A large number found on *Guterrezia microcephala*, all adults. They were observed eating the leaves. *In coitu* at this date.

Galeruca notata, Fab.—Belen, N. M., August 7th. In numbers on *Helianthus annuus*, eating the leaves.

Oedionychis scalaris, Melsh.—Grand Canon, Arizona. Hance trail, toward rim. July 12th, 1892. Quite numerous on leaves of a bush. A very active flea-beetle, straw-coloured with five black dots on each elytron.*

Haltica obliterata, Lec.—Grant County, N. M. (W. J. H.); one.

Phyllotreta pusilla.—Santa Fé, N. M., May 25th, 1892. Received from Mr. J. R. DeMier, with report that they were very destructive to cabbages. A small dark greenish flea-beetle.

Octotoma marginicollis, Horn.—Grand Canon, Arizona. Hance trail. July 10th and 11th, 1892; four.*

Chelymorpha phytophagica, Cr.—Las Cruces, N. M., June 29th, 1891. On *Helianthus annuus*. A fine large black and red species.

Bruchus pauperculus, Lec.—Las Cruces, N. M.

Bruchus, sp.—Las Cruces, N. M. Bred from pods of tornillo (*Prosopis pubescens*). Pods were gathered in November, and the beetle issued in March following. Many more issued later.

Epitragus canaliculatus, Say.—La Vega de San José, N. M., August 4th; two.

Cryptoglossa laevis, Lec.—Grant County, N. M. (W. J. H.) Also Las Cruces, N. M. (See Insect Life, V., 39–40.)

Microschatia morata, Horn.—Grant County, N. M. (W. J. H.); one. A stout tenebrionid, wholly light brownish in colour.

Asida sordida, Lec.—Grant County, N. M. (W. J. H.); one. A blackish-brown tenebrionid, with rough elytra. Another specimen from same source is smaller and narrower, and constitutes a variety of this species.

Asida obovata, Lec.—La Vega de San José, N. M., August 4th; one. A black tenebrionid, with the body widened behind. Also one from Grant County, N. M. (W. J. H.), which differs in having the elytra rufous.

Eusattus reticulatus, Say.—Winslow, Arizona, June 29th; two. One from Grant County, N. M. (W. J. H.)

Eusattus muricatus, Lec.—Winslow, Arizona, June 29th; one.

Eleodes caudifera, Lec.—Winslow, Arizona, June 29th; two.

Trogloderus costatus, Lec.—Winslow, Arizona, June 29th; one. This is a blackish tenebrionid with grooved elytra.

Hymenorus punctatissimus, Lec.—Las Cruces, N. M., July 8th, 1891. Found a good many larvæ, probably this species, in burrows

of *Diatræa saccharalis* in growing stalks of corn on College farm, the burrows containing dead chrysalids of the *Diatræa*. Adult beetles of this species were found in numbers with them in the burrows. July 16th, 1891. Large numbers of the beetles found in sheaths of sorghum infested with aphides, on College farm.

Oxacis pallida, Lec.—Winslow, Arizona, July 19th to 20th; two.

Myodites scaber, Lec.—Chaves, N. M., August 6th, 1892; two.*

Ophryastes tuberosus, Lec.—Grant County, N. M. (W. J. H.), one. A chunky grayish weevil, with prothorax warted on outer edges.

Eupagoderes decipiens, Lec.—Grand Canon, Arizona. Hance trail. July 11th, 1892; one.*

Eupagoderes desertus, Horn.—Winslow, Arizona, June 29th, 1892. A pair *in coitu*. The antennæ of both were infested with a small red mite. Large whitish gray rhynchophor. On plant No. 290, N. Mex. College Herbarium.*

Cyphus lautus, Lec.—Grand Canon, Arizona. Hance trail, near rim of canon, July 12th, 1892; one. A small grayish curculionid.*

Otiorhynchid gen. et. sp. ?.—Continental Divide, Tenaja, N. M., August 2nd, 1892; one.

Sitones californicus, Fah.—Las Cruces, N. M.; one.

Anthonomus canus, Lec.—Apache Spring, Socorro County, N. M. A small grayish weevil. Bred from galls of *Eurosta bigeloviæ* on *Bigelovia graveolens* collected June 21st, 1892. (See CAN. ENT.; 1893, p. 52.)

Tychius setosus, Lec.—Las Cruces, N. M. A single specimen beaten from mesquite *(P. juliflora)*, three miles south of Mesilla, May 16th, 1891. This is a minute rhynchophor.

Scyphophorus acupunctatus, Gyll.—Grant County, N. M. (W. J. H.); one.

Rhodobaenus pustulosus, Gyll.—Grant County, N. M. (W. J. H.); one. Much resembles *13-punctatus*. Brick-reddish in colour.

CORRESPONDENCE.

ACRIDIUM AMERICANUM.

In October last, Mr. G. C. Anderson, upon one of his visits to me, enquired what was the largest grasshopper of the country, as he had taken one which had attracted his attention on account of its size. I showed him what we had in the collection of our native species, when he remarked that it was larger and prettier than anything that was there. He said he would bring it up some time. When he did, I was surprised at the striking difference in its appearance from anything I had ever observed. He said I might retain it, which I was very willing to do, and as I could not determine it, I spread its wings and waited till the time of our annual meeting, when Mr. Fletcher at once pronounced it to be *Acridium Americanum*, and the first reported to be taken in Canada. In his Eighth Missouri Report, Prof. C. V. Riley (page 104) thus speaks of it: "It is our largest and most elegant locust, the prevailing colour being dark brown, with a broad pale yellowish line along the middle of the back when the wings are closed. The rest of the body is marked with deep brown, verging to black, with pale reddish-brown, and with whitish or greenish-yellow; the front wings being prettily mottled, the hind wings very faintly greenish with brown veins, and the hind shanks generally coral-red with black-tipped white spines. The species is quite variable in colour, size and marks, and several of the varieties have been described as distinct species." In another place the Professor remarks: "It has a wide range, hibernates in the winged condition, and differs not only in size and habits from the Rocky Mountain locust, but entomologically is as widely separated from it as a sheep from a cow." I would describe the front wings of the specimen before me as being light brown, semi-transparent and mottled with darker brown; the hind wings as hyaline, extremely delicate in texture and beautifully reticulated with dark brown. It measures three and a-half inches in expanse of wing. This species has been reported as causing considerable damage at times on the south side of Lake Erie, from whence probably it has come to us.

J. ALSTON MOFFAT, London, Ont.

*** The Editor regrets to state that two of his letters to the printers of this Magazine have recently gone astray in the mails. They contained a paper by Mr. McGillivray on "New Hampshire Tenthredinidæ," the second part of Mr. C. F. Baker's "Studies in Siphonaptera," and a review by Prof. Webster of the last volume of Dr. McCook's "Spiders and their Spinning Work." These articles were intended to have been published in the current number.

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DESCRIPTIONS OF SOME NEW SPECIES OF EPIPASCHIINÆ AND PHYCITIDÆ.

BY REV. GEO. D. HULST, BROOKLYN, N. Y.

EPIPASCHIINÆ.

Oneida luniferella, n. sp.—Tongue blackish with some light gray scales; labial palpi and face light gray; antennæ blackish gray; antennal projection light gray at base, becoming blackish gray towards summit; thorax gray, patagia lighter, becoming nearly white posteriorly; abdomen gray with black scales intermixed, somewhat washed with fuscous, and often stained with yellowish. Fore wings light gray at base to raised scale ridge immediately before the first cross-line; this line is white, rounded from costa to median vein, and thence to inner margin, edged on both sides with black and preceded by a scale ridge which is reddish brown in colour; middle field light gray, glistening, slightly powdered with blackish scales, this colour reaching to outer margin posterior to vein 5; near middle of field and between vein 1 and median vein a raised scale tuft, blackish. Outer line distinct at costa, whitish, becoming lost in the ground colour behind vein 5; this line is with a deep inward sinus from costa to about vein 5, forming a sort of lunule, which is edged on both sides with black; the inner edging is broader posteriorly, and there somewhat washed with reddish; the outer, broad, nearly filling the apical space, washed with reddish posteriorly; a marginal line of black dots. Hind wings glistening translucent whitish fuscous, with a faint yellowish stain. Beneath fore wings fuscous to outer line, that being fainter than above; apical space reddish. Hind wings slightly more fuscous and duller than above. Expands 28 mm.

Colorado. Six examples from Mr. David Bruce.

Benta Slossonii, n. sp.—Expands 25 mm. Palpi and face dark fuscous; antennæ blackish fuscous; thorax blackish, mixed somewhat with gray scales; abdomen dark fuscous, almost black, each seg-

ment edged with lighter colour posteriorly. Fore wings, basal line not very distinct, dark gray, sinuous, strongly angulated at vein 1; basal field blackish, much mixed with gray scales, especially along costa, and slightly marked with reddish at middle at median vein; middle field blackish gray, with three narrow black lines: the first edging basal line, the third limiting the field outwardly, this forming a sinus rounding inwardly within discal spot to base of veins 3 and 4, then another less pronounced sinus to inner margin, forming a prominent tooth at veins 3 and 4; the second line is slightly within and sub-parallel with the third; on the space between the first and second black lines are two oval black rings, one on cell and the other just below it, joined at each end with first and second cross-lines; outside the basal field the colour is light gray, more or less mixed with black, the outer line whitish, indistinct, showing with the darker edgings almost straight across the wing; outer field blackish, with gray intermixed, giving indications, especially apically, of a scalloped submarginal line, as well as one narrowly at margin. Hind wings, even fuscous blackish. Beneath all wings even dark fuscous, with a gray spot on fore wings along costa at beginning of outer line.

South Florida. One specimen, a ♀, from Mrs. Slosson, taken in early spring. The species is provisionally placed in the genus *Benta*.

PHYCITIDÆ.

Pyla metalicella, n. sp.—Expands 32 mm. Palpi ascending, long, black; head, thorax, abdomen and wings dull smoky black, without any indications of lines. The palpi on the outside, the face, the thorax and fore wings strongly iridescent with bronze green, this being specially marked on the patagia and base of wings; abdomen somewhat bronzy; hind wings without iridescence. Beneath all parts blackish; the thorax, legs, fore wings and anterior margin of hind wings being strongly iridescent; on the body this has a coppery tint.

Colorado. One ♂, from Mr. Bruce. A most beautiful insect, with wings narrower and longer than *P. scintillans*, Grt., and with a much more decided iridescence.

Pyla bistriatella, n. sp.—Expands 25 mm. Head, thorax and fore wings deep black, the fore wings with two broad white stripes, the inner straight, the outer slightly wavy and parallel with outer margin; hind

wings and abdomen dull black. The head, thorax and fore wings are strongly iridescent with dark bluish-green, the abdomen less so. Beneath as above, but less iridescent.

Yosemite Valley, Cala. One ♂. Differs somewhat in structure from the typical *Pyla*. The labial palpi are nearly horizontal, second member long, heavily scaled; end member very small, scarcely visible; maxillary palpi small, not scale or pencil tufted.

Pyla incorruscella, n. sp.—Expands 21 mm. Palpi and face deep black; thorax deep black with a few dark gray scales; fore wings dull black, intermixed with some dark fuscous scales; two cross-lines of stained white, the inner oblique, rounded, diffuse, the outer angulated in at vein 6, rounded outwardly from there to vein 5, then slightly wavy to inner margin. Beneath dark fuscous, two lighter fuscous spots along costa, one before discal space and the other at end of second cross-line. No iridescence on any part of the insect.

Colorado. One ♂, from Mr. Bruce. Smaller than *P. æneela*, without iridescence, maxillary palpi small, but scale tufted.

Pyla æneela, n. sp.—Expands 25 mm. Labial palpi grayish fuscous below, blackish, with blue-green iridescence above; face black, bluish iridescent; thorax black, with coppery-bronze iridescence. Wings blackish in ♂, the fore wings with scattered iridescent sales on middle of wings, scarcely any showing along edges. ♀ fore wings blackish, almost completely greenish-yellow iridescent; hind wings black, with reddish-brown tint in some lights. Beneath blackish, slightly iridescent in ♂ along anterior margin of hind wings; all parts completely iridescent in ♀.

Colorado. One ♂, two ♀ ♀, from Mr. Bruce. The labial palpi are ascending, long, end member long, maxillary palpi small, with two or three long scales at end. Abdomen of ♂ with lateral scale tufts on last segment, and a row of orange-yellow hair tufts below. ♀ with antennæ bent above base, and a sligh tuft in sinus, almost as distinct as that of the ♀; maxillary palpi also quite as prominent as in ♂. The sex is beyond question, as the ovipositor is strongly protruded.

Dioryctria Brucei, n. sp.—Expands 24 to 28 mm. Palpi gray, black at tips; head above whitish; thorax gray, more whitish on dorsal parts; abdomen alternating whitish and gray on each segment, very slightly washed with ochre. Fore wings whitish, more or less overlaid with blackish scales, giving a clear gray appearance; cross-lines whitish, very irregular, not sharply outlined. The basal with a long outward

tooth below cell, a small inward one just below this ; also a blackish spot outwardly at costa, on cell, and towards inner margin, giving the relics of an outer marginal black line. Outer line with large, deep teeth inwardly, at cell, and below it, these coalescing with the inner line in a whitish streak ; between these, three even teeth outwardly ; submarginal line whitish, scalloped, or showing only in whitish dashes at end of veins ; margin with dark lunules between the veins. Hind wings ochre-fuscous, darkest at margins; beneath nearly colour of hind wings, the lines of fore wings faintly showing.

There is some variation in the specimens ; in some the cross-lines are less diffuse, the angles more even, and a double black discal spot apparent on fore wings.

Colorado. Four ♂ ♂, 5 ♀ ♀, from Mr. Bruce.

Epischnia incanella, n. sp.—Expands 30 mm. Palpi rough scaled, drooping, light gray, with dark scales intermixed ; tongue scarcely longer then palpi ; head gray ; thorax gray; abdomen light fuscous gray, washed with ochre. Fore wings gray, much overlaid with dark gray or blackish, more lightly along the costa, which thus shows in a light gray streak reaching to outer line ; inner line indistinct, broad costally, narrow and dentate towards inner margin, faintly marked with two or three black spots outwardly ; a black spot at centre of outer margin of cell ; outer line very far towards outer margin, quite indistinct, but an outward rounding at middle, and a tooth inward near inner margin ; a tendency at margin to have the veins marked with black dashes. Hind wings light, with a fuscous shading. Underneath light fuscous, the fore wings somewhat the darker, except on marginal space.

Colorado. Two ♀ ♀, from Mr. Bruce.

Volusia pallidipennella, n. sp.—Expands 20 mm. Palpi, head, thorax and abdomen light gray, with a slight fuscous washing, the tegulæ lighter, almost white, and the abdomen more stained with fuscous. Fore wings whitish, sprinkled with black scales, giving a light gray appearance ; cross-lines indistinct, the basal consisting of a broad, dull reddish band, not reaching costa, edged each side with whitish, and this with broken blackish, not very distinct ; discal spot black, distinct ; outer line whitish, far out, sub-parallel with margin, slightly bent at middle. Hind wings light fuscous, darker at margins. Beneath light fuscous, the fore wings darker, especially towards apex, where the outer cross-line shows.

Colorado. One ♂, from Mr. Bruce.

Pinipestis umbripennis, n. sp.—Expands 24 mm. Palpi black, a little grayish at tips; head and thorax black; abdomen blackish, a little lighter on each segment posteriorly. Fore wings mouse-black, slightly grayish across basal portion within scale ridge; also a triangular, dark grayish space along costa on middle field, enclosing double black discal spots, and a faint grayish marginal shade. Basal line not apparent; scale ridge strong, jet black; outer line narrow, dark gray, bent inward at end of cell, then with three even teeth outward, then angled inward before reaching inner margin. Hind wings deep black, with a blackish-brown reflection. Beneath almost uniform dull somewhat glistening black.

Colorado. One ♂, from Mr. Bruce.

Salebria delectella, n. sp.—Expands 33 mm. Palpi thin, lightly scaled, gray; thorax blackish-gray, with a subdorsal tuft of orange-yellow scales on each side; abdomen blackish-gray, and gray-ringed on each segment. Fore wings, general colour blackish-gray; basal space, except along costa, dull reddish; middle field, first half of ground colour, the outer half much lighter gray; outer field, except towards costa, dull reddish; discal spot a large white lunule, concave side outward; basal line light gray, well out, waved, dentate; outer line gray, somewhat indeterminate on borders, with a more prominent outward dentation at middle; marginal line black. Hind wings light translucent fuscous, with black marginal line, except along inner margin. Beneath, fore wings dark fuscous, the outer line faintly showing; hind wings much as above.

Colorado. Two ♀♀, from Mr. Bruce.

In general appearance somewhat resembling *Salebria tarmitalis*, which is now put by Mr. Ragonot under the genus *Myreala*. This may also belong there, as the cell of the hind wings is very short. But as I have no male, the position of the insect is in doubt. The thoracic tufts are somewhat peculiar.

Salebria georgiella, n. sp.—Expands 17 mm. Palpi fuscous gray, blackish in front, strong, heavily scaled, reaching above head; maxillary palpi strongly pencil tufted, bright yellow; antennæ brownish fuscous, the scale tuft in bend very heavy; head fuscous gray; thorax gray or bluish-gray; abdomen ringed with ochre-fuscous and yellow ochre, somewhat tufted at end. Fore wings gray, washed with fuscous along costa, becoming clear gray posteriorly; a dull brick-red central dash at base, and a large dull brick-red spot within basal line posterior to centre and reaching

thence to inner margin, somewhat quadrate in form ; lines light gray, not well defined, the basal with an outer angle at middle and towards inner margin ; outer line rounded from costa to centre, then angled outwardly, then nearly straight to inner margin, all faintly serrate; discal spot distinct ; outer line edged both sides with darker fuscous. Hind wings ochre-fuscous, dark iridescent at apex. Beneath even dark fuscous, hind wings somewhat lighter than fore wings.

Charlotte Harbor, Florida. One ♂, from Mrs. Slosson.

CANADIAN COCCIDÆ.

III. A LECANIUM, PERHAPS IDENTICAL WITH L. RUGOSUM, SIGNORET.

BY T. D. A. COCKERELL, N. MEX. AGR. EXP. STA.

I have just received from Mr. James Fletcher a small bottle of scales found on plum at Queenston, Ontario. He writes concerning them: "Dead scales picked from a plum tree in the Niagara district, where it was very abundant on plums and much rarer on peach trees growing amongst the plums."

Directly I saw these scales, they struck me as something unusual, and yet I rather expected they would prove to be some form of *L. persicæ*. Unfortunately they were full of the mycelium of a fungus (doubtless *Cordyceps)*, as well as in some cases containing a Chalcidid parasite, so that their specific characters were very hard to make out. The fungus, which must be a very important check to their increase, was not noticed on examination with a lens; but on boiling the scales in liquor potassæ, they stained the liquor brown, and a microscopic examination showed the fungus quite plainly. Of course, from mere mycelium no determination could be made. I saw in one case what looked like germinating spores, but perhaps in this I was mistaken.

Assuming that the scales were not *persicæ*, I went through the descriptions to see what they would fit better. *Lecanium rugosum*, Sign., seemed the very thing, though comparison in detail revealed some differences.

The following information on *Lec. rugosum* was translated from Signoret by my wife. I transcribe it for the use of those who have not the original:

L. RUGOSUM, Signoret, 1873.

"Among the species which are found on the peach-tree, there is one which is neither *L. persicæ* nor *L. rotundum*, and which approaches more nearly to the latter than to the former.

"*L. rugosum* is round, rather elevated and very rugose on the sides, where there is a strong punctuation more or less confluent, and between the points smooth spaces forming a kind of hills. It is of a dark brown; the antennæ are of eight joints, of which the third, 'mutique,' is longer by itself than the five following ones, the fourth, fifth, sixth and seventh of equal length. By the antennæ alone, as well as by the shape, it is easy to distinguish *L. rugosum* from the two other species; in *persicæ* the fourth joint is longer by itself than the three following, and in *rugosum* it is equal to the others; in *rotundum* the fourth joint is equal to the third, and perhaps even longer; further, there are only seven joints to the antennæ instead of eight.

"We found this species on peach-trees in our garden, at Clamart. It is not very abundant. Its length is from 4 to 5 mm. by about the same width; height from 2 to 3 mm.

"One other peculiarity we ought to point out in this species is the form of the posterior tarsi, which are as if flattened, wider than the tibiæ and a third shorter.

"The anterior tarsi are ordinary, but have a furrow on the internal face. The claws are very wide at the base; the digitules of the claws are long and unequal in size, the one forming a more extended 'cornet' than the other. The digitules of the tarsi are long and straight, inserted at a distance from one another. The tibiæ, in general, present four to five hairs at the summit, one longer than the rest; the femora have two at the summit, the trochanters one very long one, the coxæ two or three.

"We have never met with the males, but have seen several white shells whence they had emerged. This shell is smooth in this species and rugose in *rotundum*."

So far Signoret. Now to return to the Queenston scales. We have here a scale differing from ordinary *persicæ* in being almost round in outline, very dark, and especially very rugose. Surely, then, it is Signoret's *rugosum?* But, if at first this seems an inevitable conclusion, it is rather contradicted by the microscopic char-

acters. I found, even after examining many specimens, but one antenna; but this was clearly seen to be 7-jointed, not 8-jointed, as in *rugosum* and *persicæ*. I found no legs in position, but several fairly well-preserved ones broken from the bodies. These showed the long digitules, but I did not get a sight of the peculiar posterior tarsus. The following description gives the details I found:

LECANIUM FROM QUEENSTON.

♀. Antenna 7-jointed, 3 longest, 4 a little shorter, 7 a little shorter than 4, 2 shorter than 4, 5 and 6 shortest and about equal. Formula approximately 34721 (56).

Legs well-developed; trochanter and coxa each with a hair; femur rather slender, not very much longer than tibia; tibia about one-third longer than tarsus. Tarsal digitules slender, very long. Digitules of claw also long, extending considerably beyond tip of claw, with quite large knobs. Claw nearly straight. Derm with large gland-pits, often double. Anal plates with their caudolateral sides longer than the cephalolateral.

Of species with 7-jointed antennæ, there is *L. rotundum;* but this is out of the question, from its globose, nearly smooth scale. But how about *L. juglandis (juglandifex)*, with which I have identified a species sent by Dr. Lintner from Rochester, N. Y., on plum? The antenna of this Rochester insect is just like the antenna of the Queenston species; in fact, the microscopical characters of these forms are so much alike as to strongly suggest their identity. Yet the scales seem decidedly different.

Some one may here say, How about the *Lecanium cerasifex*, Fitch., 1856? This was said to be hemispherical, nearly the size and shape of a half-pea, black, more or less mottled with pale dull yellow dots. I confess I do not know what this is, and look with some doubt on identifications of it from such a description as Fitch gave. Until some one has given us a better description from the type, I think *cerasifex* must be put in the doubtful list. There is no good reason for supposing it identical with the Queenston scale.

The solution of the question here raised must probably be left in the hands of one who can study the insect, in all its stages, on the spot. The following questions might be addressed to a suitable enquirer:—

(1.) *L. rugosum*, hitherto known from France, closely resembles our insect in outward form. Can the diversities in microscopic details be reconciled?

(2.) *L. juglandis*, from Rochester, N. Y., closely resembles our insect in microscopic characters. Can the diversities in outward form be reconciled?

(3.) Is it possibe that the parasitic fungus would so alter the scale in its growth as to make it seem like a different species?

(4.) Can the male scale be found, and if so, is it smooth or rough?

(5.) Can the Queenston people tell anything of the origin and spread of the scale?

[Mr. Cockerell has more recently examined other material from Queenston, Ont., and also some from Geneva, N. Y., and is strongly of opinion that the species in both cases is the same as the Rochester (N. Y.) *L. juglandis*. The scales are shiny, red-brown; in both cases accompanied by hibernating young.—J. F.]

SOME NEW SPECIES OF ROBINSONIA.

BY W. SCHAUS, TWICKENHAM, ENGLAND.

Robinsonia Grotei, sp. nov.—Head white, posteriorly shaded with yellow. Collar white, with a central brown spot. Thorax brown, with a central white line; patagia white, laterally edged with brown. Abdomen dorsally brownish-yellow, with a subdorsal row of small white spots, and a lateral row of small black spots; underneath whitish. Primaries above white, with the margins broadly brown, except at the apex, where the white extends to the fringe; an oblique brown band, from the costal margin at a third from the base to the inner angle, separates the white into two large spaces. Secondaries white. Primaries underneath white, showing indistinctly the markings of the upper surface.

Ex., 45–47 mm.

Hab.—Rio Janeiro, Trinidad; Jalapa, Mexico.

This species is very closely allied to *Robinsonia formula*, Grote, but differs in the straight brown margins which are sinuate in *R. formula*.

Robinsonia perfecta, Hy. Edw., is a synonym of *Sallæa ochrosterna*, Feld., and *Turuptiana obliqua*, Walk., the last being the oldest name, and generically quite distinct from *Robinsonia*, which is most closely allied to *Ormetica*, Clem. The genus *Ormetica* is congeneric with *Euplesia*, Feld., and will have priority over the latter. *Ormetica sphingiformis*, Clem., has been redescribed by Mr.

Druce as *Automolis inutata*, which is placed by Kirby as a synonym of *Chelonia tæniata*, Guér. I have not read Guérin's description, but presuming Mr. Kirby is right, the species will stand as *Ormetica tæniata*, Guér.

Robinsonia fogra, sp. nov.—Head yellowish. Collar white. Thorax white, with some gray marks; patagia finely edged with gray. Abdomen above brownish yellow; some clusters of brown hairs towards the base; a subdorsal row of white spots and a lateral row of black spots; underneath white. Primaries above white, the veins gray, the margins clouded with gray, and a terminal row of gray streaks between the veins; an indistinct and irregular outer gray line. Secondaries above whitish, clouded with gray along the margin; the fringe dark gray. Underneath, the wings are similar, but with less gray, and the white ground colour is slightly iridescent.

Ex., 44 mm.

Hab.—Aroa, Venezuela.

Robinsonia Lefaivrei, sp. nov.—Head brown, minutely spotted with white. Collar brown, with four white spots. Thorax brownish; patagia white, edged with brown. Abdomen above brown, with a subdorsal orange line; underneath white. Primaries above white; the costal margin broadly brownish yellow; the cell filled in with brown scales; the outer and inner margins broadly brown, the latter with a white streak about its centre; veins 2, 3, 4, 6 and 7 brown, dividing the white portion into a series of spots, the largest being between the median and submedian veins, and beyond the cell between veins 4 and 6; the two apical spots the smallest and oval in shape. Secondaries above white, with a long brown streak from the base to the anal angle, and a shorter streak below vein 2, from the cell to the outer margin; the costal margin narrowly shaded with brown; underneath the same, with the markings less distinct.

Ex., 44 mm.

Hab.—Rio Janeiro.

I am indebted for this species to Monsieur Paul Lefaivre, Chargé d'Affaires for France at Rio Janeiro. I have also seen a specimen in the collection of Mr. Neumoegen, of New York.

PRELIMINARY STUDIES IN SIPHONAPTERA.--II.

BY CARL F. BAKER, FORT COLLINS, COLO.

Family *Pulicidæ*, Tschb.

1880. Taschenberg, Die Flohe, p. 62.

Table of Genera.*

A. Eyes well developed; antennæ with circular incisions or cleft only on one side; head and thorax usually stout and compact; head rarely angulated in front; lower edge of head and pronotum behind sometimes with combs, abdominal segments and discs of cheeks without..... *Pulex.*

AA. Eyes wanting, or very rudimentary; antennæ with circular incisions.

B. Eyes entirely wanting; head and thorax stout and compact; head angulated in front, truncate; discs of cheeks, pronotum, and several abdominal segments with combs of numerous spines, the whole body heavily bristled. ..... *Hystrichopsylla.*

* The genus *Stephanocircus*, Skuse (Records of Austral. Mus., II., 5, Sydney, Sept., 1890), with its single species, *Dasyuri*, Skuse, parasitic on *Dasyurus maculatus*, Kerr., I do not include in this table. As characterized, it possesses a most extraordinary structure. Should further study verify all points of the description, this genus will form a very interesting addition to the family. It, however, seems probable that two species have been confused, and that both are referable to known genera. The description (for a copy of which I am indebted to Mr. Wm. J. Fox) is as follows:—"*Stephanocircus*, gen. nov. Body elongate, especially in the female, bristly, noticeably stronger at the anal extremity. Antennæ capitate, four-jointed, the second joint in the female with long bristles extending to the tip of the fourth; in the male very short; fourth joint lamellar, apparently composed of nine segments. Head moderately large; in the female with an exserted, cap-like patella in the front, strongly pectinated round its posterior margin, the face also strongly pectinated; in the male the posterior margin of the head only pectinated; eyes wanting in the female; trophi less than the length of the head; mandibles extremely slender, minutely serrated, encased in four-jointed labial palpi, which they somewhat exceed in length; lingua extremely slender; maxillæ elongate, triangular, somewhat exceeding the second joint of the labial palpi, with no apparent apical joint; maxillary palpi four-jointed, the first and fourth of about equal length, the third shorter and the second the longest, acuminate; joints of the labial palpi progressively diminishing in length and thickness. Prothorax in female with a strong pectinate fringe. Legs long, spinous; coxæ of posterior two pairs with a distinct notch posteriorly at the apex; femora very minutely and sparingly spined; tarsi five jointed, the first, second and fifth joints long, the third shorter, the fourth shortest, half the length of the fifth; claws microscopically denticulate.

"*Stephanocircus dasyuri*, sp. nov. Length of male, 1.90 mm.; of female, 2.80 mm. Castaneous brown, nitidous. Head of the male convex above, of female flat. Eyes of male small, black. Pectinal fringes and setæ black or dark brown Thorax long, in the female nearly the length of the body. Abdomen about twice as long as broad in the male, shorter in the female, darker castaneous brown in the female, bristly Legs of a uniform pale castaneous brown. Habitat—New South Wales, on *Dasyurus maculatus*, Kerr."

BB. Eyes wanting, or very rudimentary ; head and thorax slender ; head usually long, rounded in front, vertex often more or less produced ; combs on head and pronotum, and sometimes on abdominal segments, that on the head of not more than four spines on each side ..... *Typhlopsylla.*

Genus *Pulex*, Linn.

1746. Linnæus, Fauna Suecica.

1832. Curtis, British Entom., IX., No. 417. (Ceratopsyllus.)

1857. Kolenati, Wiener Entom., Monatsschrift, I., p. 65. (Monopsyllus.)

1863. Kolenati, Hor. Soc. Entom., Ross, II., p. 32, etc. (Trichopsylla, Ctenonotus, Ctenophthalmus, Ctenopsyllus, Ceratopsyllus, and Ctenocephalus.)

Table of Divisions.

A. Head beneath and pronotum behind without combs of spines.. ..... Division I.

AA. Head beneath without, pronotum behind, with a comb of spines..... Division II.

AAA. Head beneath and pronotum, both with combs of spines..... Division III.

Division I.—Table of Species.*

A. Head above sloping obliquely forward, angled in front ; segments of abdomen each with 5 to 6 transverse rows of bristles ; second joint of antennæ without long bristles..... *kerguelensis.*

AA. Head above and in front evenly rounded ; segments of abdomen each with 1 or 2 transverse rows of bristles.

B. Segments of abdomen each with 2 transverse rows of bristles ; size large ; length : male, 3 mm.; female, 4 mm ; head behind antennal groove with two rows of numerous long black bristles ; bristles on second antennal joint extending beyond end of third joint ; labial

**Pulex tuberculaticeps*, Bezzi (Bull. della Soc. Entomo., Ital., XXII., 1890, "Notes on Some Epizoic Insects"), belongs in Division 1, and is nearly related to *P. globiceps*. It was taken from *Ursus arctos*, and is characterized by the truncated and medially tuberculated front, the subequal first and fifth joints of posterior tarsi, the slightly greater size and other minor details. Its position would be between *kerguelensis* and *globiceps*. I have been unable as yet to obtain specimens of fleas from bears in this country. It is, however, a well-known fact among hunters in the West that the grizzly and silver-tip are sometimes found "alive" with them.

palpi 5-jointed; meso-and-metathoracic pleura with numerous long black hairs; male claspers very large, sharp angled above posteriorly..... *globiceps.*

BB. Segments of abdomen each with a single well-defined transverse row of bristles; size smaller: male, 2–2.5 mm.; female, 2.5–4 mm.; head behind antennal groove with very few scattering bristles; bristles on second antennal joint shorter than third joint; meso-and-metathoracic pleura with few scattering short hairs.

C. Male claspers very small, slender and cylindrical; tarsi slender; of anterior tarsi, fifth joint as long as or shorter than 1 and 2 together, and as 2 and 3 together; of middle tarsi, fifth joint three times 4 or less, and less than 2; of posterior tarsi, fifth joint less than 3 and 4 together, second three times 4 or more, much longer than 5, and more than 3 and 4 together, while 1 is longer than 4 and 5 together; internal penis support short, not spirally coiled towards the front; labial palpi 4-jointed; pale brown in colour; length: male, 2 mm.; female, 2.5 mm..... *pallidus.*

CC. Male claspers very large, half-oval; of anterior tarsi, fifth joint is longer than 1 and 2 together, and longer than 2 and 3 together; of middle tarsi, fifth joint is three times 4 or more, and as long as 2 or longer; of posterior tarsi, fifth joint as long as 3 and 4 together or longer, second less than three times 4, less than 5, and as long as 3 and 4 together or less, while 1 is longer than 5; internal penis support several times spirally coiled towards the front; labial palpi 3-jointed; colour varying between reddish and piceous; length: male, 2–2.5 mm.; female, 2.75–4 mm.

D. Mandibles and hypopharynx very short, not reaching one-half length of anterior coxæ; joints of labial palpi robust, first joints longer than second, third longer than 1; maxillary palpi, with second joint in female shorter than 4; anterior lobe of exsertible portion of penis* with upper half as broad throughout as lower half just above base..... *simulans*, n. sp.

DD. Mandibles and hypopharynx longer, reaching more than one-half length of anterior coxæ; joints of labial palpi slender, first equals 3, second shorter; maxillary palpi with second joint in female much longer than 4; anterior lobe of exsertible portion of penis with upper half very narrow and cylindrical..... *irritans.*

* See Wagner, Horæ. Soc. Ent., Ross. T., XXIII., pl. X., fig. 25, k.

Pulex kerguelensis, Tschb.

1880. Taschenberg, Die Flohe, p. 67.

This is a very unique and well-marked species. Taschenberg gives the proportional lengths of tarsal joints as follows:—On anterior legs first equals 5; on middle legs second equals 5 and equals 3 and 4 together, first is somewhat longer; on posterior legs first is a third longer than 2, 3 and 4 together somewhat shorter than 2, and 5 a little longer than 3. Length of male is given as 2 mm., of female, 3 to 4.5 mm. The four known examples were collected on the Kerguelen Islands by Mr. Eaton, from *Pelecanoides urinatrix*, Gmel, and sent to Ritsema for determination.

Pulex globiceps, Tschb.

1840. Motschulsky, Bull. Soc. Imp. de Moscou, p. 170. *(P. vulpes.)*

1880. Taschenberg, Die Flohe, p. 66. *(P. globiceps.)*

A large flea, well separated by its elongated body and proportionally very small head, standing between *kerguelensis* and *irritans* with its allies. Taschenberg says of the maxillary palpi: "their thick joints of almost equal length." However, in specimens received from him, the second joint in the female is less than three-fourths of the fourth in length. He further says the antennal grooves are open, and the colour is darkish-brown, yellowish-gray posteriorly in mature females. The labial palpi in the specimens received from Dr. Taschenberg are certainly 5-jointed, the sutures between the several joints being equally distinct. In these specimens I find the comparative lengths of tarsal joints as follows:—In anterior legs the fifth joint is about as long as 1 and 2 together, and as long as 2 and 3 together; in middle legs the fifth joint is three times 4 and longer than 2; in posterior legs the fifth joint is shorter than 3 and 4 together, and about two-thirds of 1, while the second is about twice 4 and less than 5. The following records have been made of its occurrence: From *Canis vulpes* (Halle, Taschenberg, and Holland, Ritsema), from *Meles taxus* (Zool. Gardens at Rotterdam), from *Canis*, sp. (Russia, Motschulsky).

Pulex pallidus, Taschb.

1880. Taschenberg, Die Flohe, p. 65.

I have before me a large series of specimens sent to me as a new species by Dr. Taschenberg. They were taken on *Mus albipes*, in the Island of Socotra. They coincide in every respect with the original description and illustrations of *pallidus*, and must be referred to that

species as it now stands. The specimens from the Berl. Zool. Mus., described by Taschenberg, were found on *Herpestes ichneumon*, in Egypt. The same or a nearly related *Herpestes* is found in Socotra, and as its habits resemble in many ways those of the *Mus*, it is very easy to see how the same species of flea might occur on both.

Pulex simulans, n. sp.

Two specimens of this flea, taken from opossum *(Didelphis virginiana)*, were sent to me by Mr. L. O. Howard, from the U. S. Dep. of Agriculture collection. Though distinct, yet it is very closely related to *P. irritans*, and might easily be confused with that species.

Pulex irritans, Linn.

1746. Linnæus, Faun. Suec. 2nd Ed., No. 1695.

This nearly cosmopolitan flea I have received from Mr. S. C. Dundore, of Lakeside, Cala., and through Mr. L. O. Howard, from Azura, Cala., at both of which localities it is common.

(TO BE CONTINUED.)

NOTES ON SOME REARED HYMENOPTERA, LARGELY PARASITIC, AND CHIEFLY FROM OHIO.

BY F. M. WEBSTER, WOOSTER, OHIO.

Elachistus ohioensis (MS.), Ashmead.—Reared from pupæ, in which stage it probably passes the winter; found November 7th, within the shells of beech-nuts, the kernels of which had been attacked and eaten by some kind of larva which had burrowed out these kernels, leaving only a mass of excrement. A hole in the shells indicated an attack similar to that of some species of *Balaninus*, though, as I found no larvæ of them, it was impossible to learn their exact nature. Locality, Wooster, Ohio.

Cirrospilus flavicinctus, Riley.—This was described in Lintner's First Report as being reared from *Bucculatrix pomifoliella*, Clemens, in Missouri, and also New York. My rearings were from *Aspidisca splendoriferella*, Clem., the cocoons of which were collected near Cleveland, Ohio.

Aphidius chenopodiaphidis (MS.), Ashmead.—This was reared from an Aphid found on the leaves of *Chenopodium album*, Linn., collected in the vicinity of Cleveland, Ohio, June 29th.

Isocratus vulgaris, Walker.—This and an undetermined *Apanteles* were reared with the species next following.

Lysiphlebus salicaphis, Fitch.—Reared August 24th from Aphid on Wahoo, *Euonymus atropurpureus*, Jacq , near Wooster, Ohio.

Pachyneuron aphidivora, Ashmead.—Reared from Aphid on leaves of *Liriodendron tulipifera*, Linn., collected in Bernett Woods, Cincinnati, Ohio, June 29th.

Rhaphitelus maculatus, Walker.—This was reared from *Scolytus rugulosus*, Ratz., burrowing in the trunks and larger limbs of fruit trees in Northern Ohio.

Praon coloradensis, Ashmead.—Reared from an Aphid on Gladiolus, August 8. Locality, Cleveland, Ohio.

Elasmus nigrescens, Ashmead.—Reared from cocoons on leaves received from Warren county, Southern Ohio. The leaves appeared to have been attacked by Fall Web-worm, though none of these caterpillars were present. Date of emerging, September 17.

Eulophus triclaãus, Prov.—Reared from mines of *Tischeria malifoliella*, Clem., in leaves of apple, received from near Schenectady, N.Y.

Segnipiesis nigrifemora, Ashmead.—Reared from the same host as the preceding species, and from the same locality, but from another lot of leaves.

Microgaster xylinoides (MS.), Ashmead.—Found, dead, in fold of leaf of Linden ; Wooster, Ohio, October 15, 1894. The fold had been made by some leaf-folding larva, and extended along one of the lateral veins of the leaf.

Habrocytus aulacis (MS.), Ashmead.—Reared from stems of *Lactuca canadensis*, Linn., collected near Lodi, Ohio, October 26, 1894.

Spilochalcis torvina, Cresson.—This was reared from the rather conspicuous cocoon, which is dingy-white banded with black. Have collected similar cocoons in Tensas Parish, Louisiana, and also in Indiana. These were from near Cleveland, Ohio.

Rhodites spinosa, Ashmead.—(Described only from the galls.) Both sexes were reared from spiny galls on rose, growing along the edges of woods in Huron county, Ohio. Females emerged in the fields on May 11, and the males followed within a few days. Collected and reared May, 1894.

Amblynotus iowensis, Ashmead.—This was reared from a mass of grape leaves, affected by Phylloxera and collected along the shore of Lake Erie, near Cleveland, Ohio. From the same leaves a considerable number of *Hemerobius occidentalis*, Fitch, were also reared.

The determinations were made by Mr. W. H. Ashmead.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

VIII. The Haliplidæ and Dytiscidæ of Ontario and Quebec.

The above-mentioned families of carnivorous water beetles are taken up here by request of the Editor and Committee, because of the great difficulty most students of Coleoptera, especially if they are beginners, find in identifying any of their captures in these groups, or even in separating the species with approximate accuracy. It is to be feared that with many it will prove difficult to follow the tables herewith presented; but they have been made as plain as circumstances will allow, and care has been taken to follow the best authorities in the selection of characters supposed to mark the respective species, so that by diligent attention to details the user of the paper may hope to co-relate his collection with our lists.

The Haliplidæ which may be considered first, includes a small number of beetles easily recognized by the very convex body, narrowed and often pointed before and behind; in colour yellowish, with numerous black spots on the thorax and elytra. The antennæ are ten-jointed, situated on the front before the eyes, glabrous and filiform; the legs are slender, not fitted for vigorous swimming, the hind coxæ furnished with broad plates, contiguous internally, which conceal the posterior legs at their basal half, and from three to six ventral segments. These little creatures, which, from their peculiar spotted appearance, suggest aquatic lady-birds, may be found very commonly during the summer in ponds where plant life abounds, especially Algæ. On account of their feeble swimming power they are easily captured by raking the mass of vegetable matter on to the bank, when the beetles, on crawling out to regain the water, may be secured.

Only two genera are represented in Canada: *Haliplus*, which has the elytral interstices punctate and the last joint of the palpi small, subulate, and *Cnemidotus*, without interstitial elytral punctures, the terminal palpal joint conical, longer than the third. The species are difficult to define; the following characters, however, are those accepted as specific by Mr. Crotch, in his "Revision."

Haliplus, Latr.

A. Thorax without basal impression; larger species.

b. Head with bilobed black spot on the vertex; elytral striæ not deeper at base (.15 in.).....*cribrarius*, Lec.

bb. Head unspotted; punctures of elytral striæ finer towards apex.
Thorax with black spot anteriorly (.13–.14 in.)..*triopsis*, Say.
Thorax immaculate (.16 in.).....*fasciatus*, Aubé.

AA. Thorax with an impressed plica on each side near the base; smaller species.
Pale ochreous yellow; punctuation stronger, thoracic plica shorter (.11–.12 in.).....*ruficollis*, DeG.
Fulvous; punctuation less strong, thoracic plica longer (.12 in.) .....*longulus*, Lec.

CNEMIDOTUS, Er.

FIG. 5.

Our two species are easily distinguished from those of *Haliplus* by the thorax being ornamented with two black basal spots Mr. Crotch unites under the name *12-punctatus* (fig. 5) the two forms which have been separated on these characters:
Hind coxæ with a prominent angle on the hind margin (.15 in.).....*12-punctatus*, Say.
Hind coxæ without this angle (.16 in.).....*muticus*, Lec.

The next family, the DYTISCIDÆ, is separated with ease from the *Haliplidæ* by the following characters: the body is usually much less stout and convex and more obtuse at the ends; the antennæ are eleven-jointed, usually filiform, though occasionally somewhat clavate or thickened at middle, inserted under the front behind the base of the mandibles. The posterior coxæ are large, reaching the sides of the body, but not covering the ventral segments. Legs natatorial, ciliate with long hairs. From the *Carabidæ* they may be known by the structure of the hind coxæ mentioned above.

All the species are more or less strictly aquatic in habit, and are as a rule strong swimmers. They may be found in numbers in ponds and water courses, sometimes being seen under the ice after the approach of winter. At night they fly around and are often attracted by lights. Some of the more northern forms, especially of *Agabus* and *Hydroporus*, may be taken under wet moss, or beneath stones or boards which have been lying on the grass in marshy places. The sexual modifications in the family are very interesting, the males often possessing a peculiar modification of the anterior (and less frequently the middle) tarsi, whereby the basal joints are dilated into a more or less cup-shaped surface, which is studded beneath with little stalked disks. The number of these disks in

connection with their arrangement and relative size, together with the extent and form of the dilatation of the tarsi, furnishes excellent characters for the separation of groups, and will be referred to again later.

The larvæ are aquatic and carnivorous, in form elongate, cylindrical or fusiform, the head large and flat, the antennæ frontal, the mandibles falcate, suctorial. The legs are terminated by two claws, and the abdomen lacks the tracheal branchiæ seen in the *Gyrinidæ*. They remain in the water until full growth is attained, when they repair to some convenient place under a board, stone or tuft of vegetation, where probably by the squirming motions of the body a cell is made in which the change to pupa takes place; the length of time spent in this latter stage must vary greatly in different broods and with the various species, but it was found to be ten or eleven days in the case of *Dytiscus verticalis*, of which a larva, taken at Bayfield, Wis., pupated on July 18th, the beetles appearing on the 28th.

The *Dytiscidæ* do not offer that diversity of form, colour and sculpture presented by many of the families of terrestrial beetles, hence the selection of easily seen, though superficial, points on which groups might be set apart has not been found practicable, and it has been considered wise to use in the main the structural differences proved useful by such workers as Drs. Sharp and Leconte in the primary divisions. Though the discrimination of the genera and species will sometimes be difficult for the beginner, it is hoped that at least in most cases a correct identification will be the reward of careful work with sufficient material. The two great divisions of the family, as defined by Dr. Sharp, are these:—

FIG. 6.

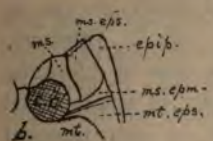

FIG. 7.

1. Metathoracic episternum not reaching the middle coxal cavity (fig. 6*a*).....Dytisci fragmentati.
2. Metathoracic episternum reaching the middle coxal cavity (fig. 7*b*). .....Dytisci complicati.

Of the accompanying cuts, fig. 6 *a* represents a diagram of a portion of the under surface of *Laccophilus*, which belongs to the fragmentati, *cc* being the middle coxal cavity. It will be seen that the mesosternal epimeron (*ms. epm.*) articulates at its inner end with the metasternum (*mt.*), and thus cuts off the metasternal episternum (*mt. eps.*) from the coxal cavity. In fig. 7 *b*, however, which is a diagram of similar parts of *Colymbites* of the complicati, the mesosternal

epimeron does not articulate with the metasternum, and thus allows the episternum of the latter to reach the cavity. These features are not, as a rule, difficult to make out from specimens, and form the basis of the modern classification of the family. Both figures, which are taken from Dr. Sharp's memoir, are lettered alike, *ms.* being the mesosternum proper, *ms. eps.* its episternum and *epip.* the epipleura. Of the Dytisci fragmentati only one genus is recorded in the Canadian list, *i. e.:*

LACCOPHILUS, Leach.

This includes two species from the fauna under consideration, both of which are rather small, very active beetles of ovate form and pale colour, in which yellowish or testaceous predominates. They separate thus:

Larger (.24 in.), head, thorax, legs and under surface testaceous; elytra dark, with the margin and four submarginal spots (subhumeral, median, post median and subapical) yellowish, also with three irregular yellowish basal marks and a narrow sutural line..... *maculosus*, Germ.

Smaller (.20 in.), pale; elytra with the subhumeral mark of *maculosus*, the others confused..... *proximus*, Say.

The Dytisci complicati form the bulk of the Canadian fauna in this family, and may be conveniently divided into four tribes as follows, in order to avoid a long and complicated synoptic table:

A. Prosternum deflexed between the front coxæ, front and middle tarsi four-jointed or apparently so, small species ..... Hydroporini.

AA. Prosternum not deflexed; tarsi distinctly five-jointed.

b. Front tarsi of males with three* basal joints dilated, forming an oblong or elongate surface ....Colymbetini.

bb. Front tarsi of males dilated so as to form a rounded or triangular disk.

Posterior pairs of spiracles large, transverse; ♂ anterior tarsal disk rounded, the cupules of unequal size. Posterior tarsi with two nearly equal claws except in *Hydaticus*..... Dytiscini.

Posterior pairs of spiracles small, anterior tarsi of ♂ forming a subtriangular disk having four rows of small, equal cupules. Hind tarsi with one claw or very unequal claws..... .....Cybistrini.

*There are only two in *Agabinus*.

Of the above-mentioned tribes the *Hydroporini* contains nearly all of the small species, and can be treated only with considerable difficulty, as the genera are distinguished by structural characters not always evident without the destruction of a specimen. After some practice, however, the facies will be found a tolerably reliable guide. The genera may be known by these characters:

A. Small (.06 to .07 in). First ventral connate with hind coxæ.
Form rounded, robust ..... *Desmopachria.*
Form oblong, depressed ..... *Bidessus.*

AA. Larger (usually over .10 in.) First ventral free.
b. Scutel distinct..... *Celina.*
bb. Scutel invisible.
Elytral ligula* distinct, abrupt..... *Cœlambres.*
Elytral ligula wanting.
Mesosternum not attaining metasternum..... *Deronectes.*
Mesosternal fork connected with the intercoxal process of the metasternum..... *Hydroporus.*

DESMOPACHRIA, Bab.

D. convexa, Aubé, is a small species (.07 in.), rounded and convex in form, and of a shining brownish-red colour without markings. The elytra are finely punctured, the clypeus with distinct margin. I find it here in small creeks or ditches through meadows.

BIDESSUS, Sharp.

Contains two small Canadian beetles of depressed, oblong form and brownish colour, sometimes with paler markings. The thorax and elytra have a common basal striola on each side.

Nearly unicolorous, punctuation fine (.06 in.). ..... *affinis*, Say.
Brownish, elytra with paler shades and coarse punctures (.06 in.) *fuscatus*, Cr.

CELINA, Aubé.

The Canadian records give *C. angustata*, Aubé, as an inhabitant of the region, possibly in error, as the genus is characteristically southern. It is a parallel, elongate insect of a brownish-red colour, the elytra darker, mucronate. The thorax is transverse, gently rounded on the sides, the disk with fine punctures, which become deep in front and on the sides near the base (.14 in.).

*This is a tongue or raised process on the under surface of the elytra near the outer margin. They must be lifted to show it.

Cœlambus, Thom.

Several species belonging to this genus may be known by the presence of a ligula on the inferior surface of the elytra near the extero-posterior angle; it seems to render possible a more perfect fitting together of the elytra and the ventral segments and may easily be seen by raising the wing-case. In colour most of the *Cœlambi* are pale above with more or less distinct black markings. Beneath the body is convex, sometimes much so.

A. Body beneath rufous, very convex. Head and thorax rufous, elytra brownish, or with distinct irregular pale markings (.12 to .13 in.).....*inæqualis*, Fabr.

AA. Body black beneath, less convex.

b. Larger (.20 to .22 in.), deeply or coarsely punctate. Colour variable.....*impressopunctatus*, Schall.

bb. Smaller (.11 to .17 in.).

c. Thorax hardly narrower than elytra. Piceous; head, feet and thorax testaceous, the latter infuscate at base and apex (.11 in.).....*turbidus*, Lec.

cc. Thorax distinctly narrower than the elytra.

Oval, convex, testaceous above, elytra with fine and coarser punctures intermixed (.13 in.).....*ovoideus*, Lec.

Longer, less convex, piceo-testaceous above.

Thorax and elytra hardly infuscate (.15 in.) *patruelis*, Lec.

Thorax infuscate at middle, elytra at apex (.17 in.) .....*nubilus*, Lec.

Deronectes, Sharp.

The two *Deronectes* recorded from the Canadian fauna are densely punctured, opaque pubescent insects. They separate thus:

Oblong-ovate, legs, antennæ and body beneath rufous, thorax with front margin, base and two large basal spots black, elytra with six or seven more or less interrupted and confluent vittæ (.17 in.).....*depressus*, Fabr.

Elongate-ovate, black above and beneath, legs and antennæ red, elytra greenish-black, with or without many narrow, more or less confluent vittæ (.18 in.).....*griseostriatus*, DeGeer,

Hydroporus, Clairv.

A large genus, difficult to deal with on account of the similarity of several of the species and of the difference in the sculpture, which shows itself occasionally in the two sexes. The annexed table of the Canadian species is in the main a translation of the necessary portions of Dr. Leconte's arrangement of the genus in the Proc. Phil. Acad., 1855, with such changes in the names as will bring it into accord with our present lists:

A[1]. Oblong-elongate, glabrous, thorax with basal impressed striolæ, the whole base transversely depressed, sides forming an angle with the elytra. Clypeus not margined. Colour above ochreous, head with one, thorax with two fuscous marks, elytra each with six linear vittæ and two submarginal spots fuscous (.17 in.) ..... *alpinus*, Payk., var. *12-lineatus*, Lec.

A[2]. Oblong-ovate, moderately convex, confusedly punctate, pubescent; sides of thorax forming an angle with the elytra, hind angles rectangular, clypeus truncate, colour rufo-testaceous, elytra with black fasciæ (.17 in.) ..... *hybridus*, Aubé.

A[3]. Oblong, less convex, pubescent; elytra strongly punctured, with two smooth narrow lines on each side, clypeus rounded; above black, head and elytral fasciæ testaceous (.13 in.) .. *striatopunctatus*, Mels.

A[4]. Oblong, usually obtuse in front; thorax not or hardly forming an angle with the elytra, which are without smooth lines.

b. Pubescent; thorax regularly evenly punctured.

c. Clypeus rounded, broadly margined. Colour ferruginous, thorax blackish at base and apex, elytra with black fasciæ.

Thorax finely margined (.18 in.) ..... *consimilis*, Lec.

Thorax broadly margined (.17 to .18 in.) (fig. 8) .. *undulatus*, Say.

Fig. 8.

cc. Clypeus rounded, not margined.

d. Colour ferruginous, elytra black, with yellowish spots or vittæ.

e. Elytral spots forming transverse fasciæ, thorax blackish at base (.18 in.) *spurius*, Lec.

ee. Elytral spots linear, subconfluent.

Thorax infuscate at base and apex (.18 in.) ..... *sericeus*, Lec.

Thorax not infuscate (.08 in.) .. *vittatipennis*, G.&H.

eee. Elytra black, margin and two vittæ on each testaceous.

Thorax dark at base and apex (.16 in.). *vittatus*, Lec.

dd. Black or blackish above, sides of elytra often rufescent.

f. Punctuation indistinct.

Sides of prothorax oblique (.20 in.).. *modestus*, Aubé.

Sides of prothorax rounded (.21 in.)... *notabilis*, Lec.

ff. Punctuation distinct (.16 in.)..... *niger*, Say.

bb. Pubescent or glabrous; thorax unequally punctured, disk often nearly smooth.

g. Thorax hardly margined at the sides.

h. Sides of thorax not forming an angle with the elytra.

More elongate, sub-parallel (.16 in.). *americanus*, Aubé.

Broader, pointed behind, more obtuse in front (.16 in.)..... ..... *dichrous*, Melsh.

More ovate, humeral angles pale (.15in.). *signatus*, Mann.

hh. Sides of thorax forming an obtuse angle with the elytra.

Black, sparsely pubescent (.14 in.)... *caliginosus*, Lec.

Pubescence wanting (.12 in.)..... *tristis*, Payk.

gg. Thorax conspicuously margined at sides.

Pubescent, black, feet rufo-piceous (.17 in.). *tenebrosus*, Lec.

Glabrous, rather broad, thorax very faintly punctulate, elytra faintly punctate (.14 in.)..... *stagnalis*, G. & H.

Glabrous, still broader and shorter, thorax nearly smooth, elytra more sparingly and strongly punctate (.14 in.)..... *oblitus*, Aubé.

bbb. Glabrous, thorax equally punctate; ferruginous, elytra black with testaceous fasciæ, thorax broadly infuscate at apex, body beneath piceous black (.14 in.).. ..... *concinnus*, Lec.

A⁵. Elongate, obconic, glabrous, elytra piceo-testaceous, coarsely punctate, clypeus rounded not emarginate, male antennæ dilated at middle.

Punctuation mixed, fine and coarser (.20 in.).. *oblongus*, Steph.

Punctuation uniform (.25 in.)..... *difformis*, Lec.

A⁶. Sub-ovate, convex, finely pubescent, clypeus broadly emarginate at middle; yellowish testaceous, finely punctured, elytra piceous with lateral spots (.09 in.)..... *mellitus*, Lec.

NEW HAMPSHIRE TENTHREDINIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N.Y.

The new species described below were contained in a collection of saw-flies recently received from Mrs. Annie Trumbull Slosson, and were collected on Mount Washington and at Franconia, New Hampshire. The collection was of interest on account of the number of species it contained which are evidently related to a boreal fauna.

Macrophya mixta, n. sp.— ♀ Black, with the following parts white: two spots on the clypeus, the labrum, a spot on each mandible, two spots on the occiput pseudocaudad of the ocelli, a narrow line on collar and tegulæ, the anterior coxæ at apex and a narrow line at side, the middle and posterior coxæ at apex, the trochanters, the distal halves of the anterior femora, the anterior tibiæ beneath, the knees of the middle legs, the middle tibiæ beneath, the posterior tibiæ with a band at middle, all the tarsi except the base of the first segment and the apices of the others, a large spot on the posterior coxæ, two spots on the caudal margin of the basal plates, and a narrow margin on basal plates at side; costa and stigma black; lanceolate cell closed; clypeus emarginate; third segment of the antennæ twice the length of the fourth; head coarsely punctured. Length, 8 mm.

Habitat.—Mount Washington and Franconia, New Hampshire.

This species is related to *flavicoxæ*, Nort., but readily separated by having the posterior femora wholly black.

Macrophya nidonea, n. sp.— ♂ Black, with the following parts white: the clypeus, labrum, a spot on each mandible, the eighth and ninth segments of the antennæ, the collar, the scutellum, a narrow transverse band on the metathorax, the apices of all the coxæ, the trochanters, a spot on each of the posterior coxæ, the basal third of the posterior femora, the posterior tarsi beyond the middle of the basal segment (their apices are fuscous), abdominal segments two to five above and below (the following segments are blackish-piceous), and a small dot near the apices of posterior tibiæ above; first segment of the antennæ but little longer than second, third and fourth subequal; costa pale, stigma black; lanceolate cell closed. Length, 8 mm.

Habitat.—Franconia, New Hampshire.

Near *trisyllabus*, Nort., but readily recognized by the almost wholly black posterior femora and tibiæ.

Macrophya Slossonia, n. sp.— ♀ Black, with the following parts yellowish-white: the labrum, clypeus, the mandibles, a triangular spot beneath the antennæ, a lunate spot beneath the eyes, a dot at the upper angle of the eye, a spot on the sides of the collar, the scutellum, a spot above the posterior coxæ, all the tarsi, and the sides of the basal plates; the following parts are rufous: the three basal segments of the antennæ within, antennal segments eight and nine, the tegulæ, the anterior coxæ before, the anterior femora except a black line above, the anterior tibiæ, the middle femora slightly at apex in front, the middle tibiæ, the basal half of the posterior tibiæ, the costal margin of the wings, the stigma in front, and abdominal segments three to five; third segment of the antennæ about one-third longer than the fourth; inner spur of anterior tibiæ bifid; claws emarginate; eyes strongly converging at base, not reaching the base of the mandibles; clypeus deeply emarginate; a fuscous dot in the second submarginal cell; lanceolate cell with a short, straight cross-nervure. Length, 9 mm.

Habitat.—Franconia, New Hampshire.

Dedicated to Mrs. Annie Trumbull Slosson. This is nearest *bifasciata*, Say, but has the posterior femora wholly black.

Taxonus borealis, n. sp.— ♀ Black, with the following parts white: the clypeus, labrum, the mandibles except at apex, coxæ, trochanters, tegulæ, the collar with a narrow margin, and venter except apical segment and the sheaths of the ovipositor; the following parts are rufous: abdominal segments two to five above except at sides where they are marked with a large round fuscous spot, occupying most of the side of each segment, the legs except the parts above named and the apices of the middle tibiæ, the apex of the posterior femora, the apex of the posterior tibiæ and the posterior tarsi entirely; the head shining black, polished; the lateral sinuses deep, reaching the back of the head; the clypeus deeply emarginate; the labrum acutely rounded; the antennæ short and slender, the third segment twice the length of the fourth; the thorax and pleuræ shining, polished; wings hyaline, costa and stigma at base, white; stigma black at apex; veins black; posterior wings with two middle cells. Length, 7 mm.

Habitat.—Mt. Washington and Franconia, N. H.

Tenthredo redimacula, n. sp.— ♀ Rufous, with the following parts black: a transverse spot at the ocelli, another just above the base of the antennæ, connected each side by lines which extend from the vertical spot

to the base of the clypeus in the lateral sinuses, thence along the base of the clypeus and the pseudorsal margin of the mandibles to their pseudocaudal side, the occiput, the prothorax except a small spot on the apex of the collar, a spot at the apex of the median lobe of the mesothorax, the side lobes entirely except a small portion at middle, the pectus, the pleuræ except an oblique spot at middle, the sutures of the metathorax, the basal membrane, the caudal margin of the basal plates, abdominal segments one to three, the venter except at apex, the anterior coxæ, the anterior trochanters except beneath, the middle coxæ except beneath, the middle trochanters, the middle femora narrowly at apex and at base above connected by a fuscous line, the middle tibiæ with a line above on apical half, the posterior coxæ at base and apex, the posterior trochanters, the posterior femora and tibiæ with a line at base and apex above, and the stigma except at base; the following parts yellow: the clypeus, labrum, the mandibles, a spot above the posterior coxæ, the sides of the basal plates, the anterior femora and tibiæ, and the middle and posterior tibiæ before; the legs except parts named, reddish-yellow; clypeus emarginate; costa rufous, subcosta black; veins rufous; third segment of the antennæ twice the length of the fourth. Length, 12 mm.

Habitat.—Mount Washington, New Hampshire.

This species is closely related to *diluta*, Cress.

Tenthredo nigricollis, Kirby. — ♀ Black, with the following parts white: the labrum, the clypeus, mandibles, segments six to nine of the antennæ, a spot above the posterior coxæ and a spot on the sides of the basal plates; the four anterior tibiæ and tarsi testaceous; wings yellowish hyaline; nervures brown; costa yellowish, stigma black; collar black. Length, 12 mm.

Habitat.—Hudson's Bay Territory (Kirby), Mount Washington, New Hampshire.

This species is related to *grandis*, Nort., and *antennata*, Kirby, but it has the collar black.

Tenthredo basilaris, Prov.—♀ Black, with the following parts yellowish-white: the clypeus, labrum, the mandibles except apex, which are ferruginous, the cheeks, a dot at the summit of the eyes, the tegulæ, collar above, a spot above the posterior coxæ, the sides of the basal plates, the apical half of the anterior coxæ, the trochanters except a black spot above, and the anterior femora and tibiæ in front; the following parts are

rufous, the basal segments of the antennæ, the legs except the parts named, the base of the anterior coxæ, the middle and posterior coxæ, a spot at the base of the middle femora above, the apex of the posterior femora and tibiæ, and the abdomen except the basal plates; clypeus emarginate; the eyes strongly converging below; third segment of antennæ about one-fourth longer than the fourth; stigma at base pale. Length, 12 mm.

Habitat.—Franconia, New Hampshire.

This species is nearest to *ruficolor*, Nort., but differs in having the apex of the posterior femora black above.

Tenthredo frigida, n. sp.—♂ Black, with the following parts yellowish-white: clypeus, labrum, the mandibles except tips which are rufous, cheeks, tegulæ, collar, a spot above anterior coxæ, a line on pleuræ, a spot above posterior coxæ, a narrow margin to the sides of the basal plates, the prosternum, the pectus, the anterior coxæ, the anterior trochanters, and femora except a black line above; remainder of legs rufous except a black line above on the middle femora and the posterior trochanters and a black spot at the base of the posterior femora above, and the apices of the segments of the posterior tarsi black; the abdomen except the basal half of the first segment, rufous; costa rufous, stigma black; veins black; clypeus emarginate; third segment of the antennæ one-third longer than fourth; front deeply hollowed out between the eyes; eyes strongly converging below. Length, 10 mm.

Habitat.—Mount Washington, New Hampshire (Mrs. Slosson); Olympia, Washington (Trevor Kincaid).

This species is related to *rubella*, Cress, but differs in having the four anterior femora with a black line above.

Tenthredo pallicola, n. sp.—♀ Black, with the following parts yellowish-white: the labrum, clypeus, the mandibles, the cheeks as far as the middle of the eye, the front below the antennæ, a narrow margin on the inner side of the eye as far as their posterior margin, the collar, tegulæ, a broad oblique band on the pleuræ, the ventral margin of the pronotum, the posternum, the pectus at middle, a spot above the posterior coxæ, all the coxæ and trochanters, the basal half of the anterior femora, and the middle and posterior femora at base; the following parts are rufous: the remainder of the anterior and middle femora, tibiæ, and tarsi, the posterior femora and tibiæ at middle, the apical segment of the posterior tarsi, and the abdomen beyond the basal plates, except the sheaths

of the ovipositor which are black; the apical third of the posterior femora, the extreme base and the apical third of the posterior tibiæ, and the posterior tarsi entirely except the apical segment, black; antennæ black; the third segment twice the length of the fourth; the basal plates finely margined with fuscous white at sides; the wings hyaline, the costa and base of the stigma rufous; veins brownish. Length, 11 mm.

Habitat.—Mount Washington, New Hampshire.

Readily separated from *pallicoxa*, Prov., by wanting the black lines on anterior legs and in having the three basal abdominal segments rufous.

Tenthredo barnstonii, Kirby.—♂ Black, with the following parts white: clypeus, labrum, the mandibles except apex, palpi, the four anterior femora and tibiæ in front, and a spot above the posterior coxæ; the inner spur of the anterior tibiæ bifid; the following parts rufous: the apical segments of all the tarsi, and the abdomen, except the basal plates and the first segment; the basal plates entirely and the first abdominal segment except a diamond-shaped rufous mark at middle, its long axis being transverse, black; the four anterior tarsi are paler before but not nearly so light as the tibiæ and femora; costa and stigma at base testaceous; clypeus emarginate; third segment of antennæ twice the length of the fourth; wings hyaline. Length, 9 mm.

Habitat.—Hundson's Bay Territories (Kirby), Mount Washington, New Hampshire.

This species is related to *tricolor*, Nort., and *occidentalis*, Cress. From the former it is separated by having the middle femora pale beneath, and from the latter by having the abdomen black at base and rufous at apex.

Tenthredo remota, n. sp.—♀ Black, with the following parts yellow: the clypeus, labrum, the mandibles except at apex, the cheeks, the tegulæ, collar, a curved mark above the anterior coxæ, a spot above the posterior coxæ, the basal membrane, the sides of the basal plates and their posterior margin very narrowly, the coxæ at apex, the trochanters, except a black spot above, the anterior and middle femora and tibiæ except a black line above, the anterior tarsi, the middle tarsi except fuscous spots on the apices of the segments, the posterior femora at base beneath slightly, and the apical segment of the posterior tarsi; abdominal segments one to three black, the remainder rufous; eyes strongly converging at base; third segment of the antennæ about one-third longer than fourth; costa and

stigma black, paler at their juncture; marginal cross-nervure strongly bowed, received by the third submarginal cell at its apical two-thirds; inner spur of the anterior tibiæ with an oblique prolongation on the side. Length, 13 mm.

Habitat.—Franconia, New Hampshire.

Closely related to *barnstonii*, Kirby, from which it is separated by having the collar and tegulæ yellow.

IN REPLY TO MR. HULST.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Mr. Hulst has been at the pains of taking a sentence of mine as the text of a discourse as to the value of genitalic characters in classification, in the January number of the CANADIAN ENTOMOLOGIST. Whether this sentence will really bear the edifice Mr. Hulst has erected upon it, is a matter which hardly concerns me. Before either Mr. Smith or Mr. Hulst wrote, I had pointed out the value of the genitalia in generic groupings, in this following Lederer, as an accessory character. My opinion had been (but this is only an opinion) that morphologically the characters drawn from the male anal appendages were of similar value to those drawn from the antennæ. I either did not hear, or had forgotten, Prof. Fernald's unprinted paper on the classification of the Tortricidæ. As I took the greatest interest in Prof. Fernald's studies, it is more than probable I did not hear it. If the sub-family *Phycitinæ* can be divided into two groups or tribes from a decided modification of the genitalia, I think there would be no objection to its use, except that the character is difficult of verification. I would ask Mr. Hulst how he comes to classify species, of which he only knows the female, with such certainty in his paper? But this and other questions as to Mr. Hulst's classification are a matter for M. Ragonot to consider, and those who especially interest themselves in the study of the *Phycitinæ*. My sentence has another origin and meaning which I will illustrate. During a visit Mr. Smith paid me on Staten Island, he pointed out to me that the legs of our *Catocalæ* were differently spined in the different species. I had not observed this. Shortly afterwards we had a new paper by Mr. Hulst on *Catocala*, illustrated by Mr. Smith, in which the species were strangely jumbled on the strength of this character. In fact, Mr. Hulst went so far as to count the number of spines on the joints to found his divisions. [Compare Bull. Brook. Ent. Soc., III. and VII., 31.] In the American Naturalist will be found a

notice, by Dr. Packard, of this paper, which I almost lack the patience to discuss. Now, after the extended work of Mr. Smith upon the genitalia of the Noctuidæ, comes Mr. Hulst with his genitalic sub-families of the *Phycitinæ*. This is what I meant by Mr. Hulst's "mission."

And now as to the *Pyralidæ*. The student will find that, in proposing the group or sub-family *Epipaschiinæ (Epipaschiæ)*, in 1878, I gave a long comparison of the structure (always excepting the genitalia) on page 685 of the U. S. Geol. Survey, Vol. IV. Therefore, although I emphasize the character of the peculiar development of the male antennæ, I did not then base my new group on this character alone, which Mr. Hulst now erroneously charges me with doing (p. 11). May I ask Mr. Hulst why, in his subsequent paper on this group in Ent. Am., he credited its creation to Lord Walsingham? I am glad to be able to refer to my paper of 1878, in which I, for the first time in America, gave full details with figures of the structure of genera of the *Phycitinæ (Phycidæ)*, always excepting the genitalia. On page 692, l. c., I define this group quite fully, and draw attention to the peculiar structure of the female frenulum, a character which I did not find mentioned by my predecessors. I gave abundant generic details, with figures of the neuration, which I recapitulated a little later in the American Entomologist. May I ask what Mr. Hulst means when he says of these papers that I made "no progress"? In the pages of the Brooklyn Entomological publications will be found Prof. Fernald's revision of Mr. Hulst's synonyms in the *Pyralidæ*. To have redescribed Walker's irrecognizable species is no reproach, but Mr. Hulst has even gone into other families for his "new species," and Mr. Ragonot calls his method of describing—I think, correctly—"haphazard." As to this sort of work, I think I may repeat Mr. Hulst's question: "Is it scientific?" Had Mr. Hulst not repressed my work, and I think entirely misrepresented it on the *Phycitinæ*, giving my titles away to others, it is probable that I never would have penned my text to his sermon. And had his work in descriptive entomology been of a different nature, I should have had no legitimate doubt as to the value of his structural observations.

CORRESPONDENCE.

MUNCHAUSEN SUBSTANTIATED.

On one occasion when that illustrious and veracious traveller, Baron Munchausen, was pursuing the enemy into the gate of a fortified town, the portcullis dropped and cut off the hinder part of his horse. Heated by the conflict and the routing of the enemy, he rode to a tank to give the faithful animal some water. The horse drank like the parched earth after a six-months' drought, until the Baron finally looked around and saw the mutilation, and found that as fast as the horse drank, the water ran out of his sliced-off body, and that his thirst would probably never be slaked.

The universal verdict of the reading public for many years has placed Munchausen high upon the long list of writers whose tales are more interesting than true, and yet physiologists tell us that in the simple narrative which I have just briefed the Baron was one of the first to voice a great physiological fact. That is, that while thirst is felt in the mouth and throat, it is in reality a general craving of the whole system, and that no amount of water in the mouth alone will prevent an animal from dying of thirst.

Now, as Munchausen was ahead of his generation as a physiologist, why should we not more patiently search in his works for other truths? Just as we have our investigators and expert interpreters of hidden meanings in Shakespeare and Browning, and the Wagner music dramas, why should not societies be formed for the investigation and interpretation of Munchausen?

All this, however, is theoretical and suggestive, and introductory to the statement that I know of a chain of facts which resemble Munchausen's horse-decorpitation story, and briefly and without further plea, the facts are these:

There is a genial little caterpillar which disports itself among the leaves of the Washington shade trees in the month of August, and which is known to its select circle of acquaintances as the fall web-worm. There is also an enterprising green bug of predatory instincts which is called the soldier-bug, and which, afflicted with as strong and persistent a thirst as that of a Kentucky colonel, seeks continually to assuage it by drinking the blood of the fall web-worm. In this gory pursuit, however, the soldier-bug has a strong rival in the wheel-bug, who, if the former is compared to the Kentucky colonel, must be likened for thirst to the Georgia Judge—the

Washington variety. The interests of these two cheerful creatures conflict. Their sanguinary occupations lead them to the same hunting-ground, and sometimes there are not worms enough to go round.

On such an occasion as this a soldier-bug, awaking early with a bad headache and a tremendous desire for a cocktail, found a solitary web-worm, inserted his beak into the wriggling body, as one would put a straw into a brandy smash, and began to suck. At this moment a wheel-bug discovered the pair, and stuck his beak into the back of the soldier-bug, and also began to suck.

There was the soldier-bug in precisely the situation of Munchausen's horse. As fast as he sucked the blood of the caterpillar, it was sucked out of him by the wheel-bug. The observer's sympathy for the web-worm was lost in admiration for the pluck of the soldier-bug and in sorrow for his predicament, until both admiration and sorrow were overcome by the brilliant thought that in this observation was Munchausen substantiated.

CIMEX.

BOOK NOTICE.

"AMERICAN SPIDERS AND THEIR SPINNING-WORK.—A Natural History of the Orb-weaving Spiders of the United States, with Special Regard to their Industry and Habits: By HENRY C. MCCOOK, D. D., author and publisher, Philadelphia, Vols. I. to III., 1889–1894."

It is with pleasure that the nature-loving public congratulates Dr. McCook on the completion of his self-imposed and heroic task,—not alone of five years' duration, but more nearly of twenty-five. The author started out five years ago to give to the world a work on spiders, and he has not only done this, but has also given us a model of patient, conscientious and unprejudiced labour that will stand as a monument to its author long after he has himself laid down his pen and passed to the unknown beyond; he has given to the observer in whatever department of natural science, a standard which he may well follow. Purity, both as to observation and conclusion, is stamped on every page. It is as if he had plunged his cup into the clear, cool mountain stream and handed us, direct, a refreshing draught of the crystal waters. He has evidently not studied spiders in his pulpit, but if there is any other place that he has visited, and whence he has not brought back some

original observation on these wonderful creatures, as portrayed in his work, I do not now recall it. He has interested himself in their love affairs, and, though not officiating, has been present at their weddings; has gone into the home of Madam Spider and told everything he saw there,—how she cares for her young with a tenderness that is almost human, and treats her poor husband in a manner decidedly the reverse; how they secure their food and protect themselves and their young from their enemies;—in short, he has gone into every phase of spider life and given us a simple record of all that he saw, at the same time not forgetting to call attention to the works of others, and give strict credit for all that they have done, a sure indication of honesty and sincerity of purpose. That the work is, to an extent, imperfect, and, perhaps, defective, the author does not hesitate to admit, but there is everywhere shown a commendable desire to reduce these defects to a minimum, and few could have done as well. Had the author chosen to consult his personal comfort and financial interests, he would never nave undertaken the task, which, from first to last, was of necessity a labour of love, the financial loss being only compensated for by the thanks of his fellow-workers, and the knowledge that, with his pen and pencil, he has done more than have any others of his countrymen, to further our knowledge of this most interesting group of organisms.

The first volume treats particularly of snares and nests; the second volume considers the cocooning industry, maternal instincts and general habits; the third volume contains six chapters of natural history descriptions, while the remaining and major portion is devoted to descriptions of the Orb-weaving fauna of the United States. The work contains over 1,200 pages, illustrated by 853 uncoloured figures, drawn from life, and many of them being full-page illustrations; 40 lithographic plates, on which are engraved 913 figures, coloured by hand from nature, and a full page engraving of Prof. Hentz, the father of American Araneology.

The work should find its way into every public and educational library, and especially the latter, while the individual who possesses himself of a copy will treasure it carefully and part with it only of necessity.

F. M. W.

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VARIATION IN NEMEOPHILA PETROSA AT LAGGAN IN WESTERN ALBERTA.

BY THOMAS E. BEAN.

At 5,000 feet altitude, in the vicinity of Laggan, *Nemeophila petrosa* flies during July. This is one of our commoner moths, and appears to be the only bombycid of common occurrence in the district. Although occasionally found near timber line, it is rare at that elevation. Under natural conditions only one flight occurs in the season, and larvæ from eggs of that flight hibernate principally at an early stage. In the house, with a warmer night temperature, larvæ resultant from the July flight will go to imago late in October instead of hibernating. In the wild environment, a second flight is prevented by the low night temperature. *Petrosa* frequents moist banks, ditches, margins of old roads, and open ground well supplied with plants. A great majority of the individuals seen in flight are males, the disparity in relative number of males and females observed resulting from the quieter disposition of the females. The males are very restless and readily take flight, thereby attracting observation. The females, less demonstrative, fly but little and are seldom noticed. Males, the physiologists kindly inform us, are katabolic, and females anabolic; we may discover, unaided, that the terminology is diabolic. Results obtained by bringing to imago a large number of wild larvæ and pupæ indicate that the females of *Petrosa* somewhat outnumber the males. The larva is a general feeder, thriving on aster, strawberry, or grass, and extremely partial to the newly formed pupa of *Nemeophila petrosa*.

The plate which this notice is intended to explain and supplement has been prepared under the skillful supervision of Mr. H. H. Lyman. Selection of specimens for the purpose proved a difficult matter, on account of the necessary limitation to a single plate of twenty figures. Complete illumination of the subject would require at least five plates. Were such ample resources of illustration available, three of the plates would serve to present effectively the principal sequence of pattern

evolution, by displaying a progressive series of minute gradations of pattern; a fourth plate might be devoted to an accessory suite of specimens illustrating subordinate lines of variation; and on the final plate an interesting series of aberrant examples could be presented in an order suggestive of their systematic relationship. Five plates, so managed, would furnish a pictorial analysis of the pattern-building method of *Petrosa* more instructive than a laborious essay.

Limited to twenty figures, I found it advisable to select a set of examples suitable for a merely synthetic plate, indicating the leading results of the pattern development rather than its progressive details. The plate contains figures of eleven *Petrosa* males, and seven females. A somewhat fuller series of variations could have been shown by figuring only males. By selecting partly females, however, a distinct advantage was gained, as I have included four appropriate examples bred from one lot of eggs, and incidentally a direct proof is thereby supplied that the plate represents in its local specimens a single valid species. Numbers 1 to 9, inclusive, also 11 and 16, are males. Numbers 12, 13, 14, and 17 to 20, inclusive, are females. For comparison, two instances of *Nemeophila plantaginis* are included, numbers 10 and 15. The former is a male, form *Hospita*, from northern Finland; the latter a female, from the Amour region in eastern Siberia.

My analysis of *Petrosa* is based on examination of 199 males and 160 females. The series is as complete as can be desired, comprising all specialties and stages of pattern caught or bred during seven collecting seasons. The entire material was first assorted in an order expressing the gradual modification of pattern, beginning with initial "*Scudderi*," and progressing to ultimate "*Petrosa*." In order to estimate in numerical terms the prevailing tendency or present attitude of the moth as to pattern, the extended column of variation has been sectioned into separate masses, thus distributing into convenient sections the pattern-distance between the two extremes of variation.

One hundred and seven flown males are first considered. Section 1 contains 14 of these specimens, which, as to upper surface at least, are formal *Scudderi*. Fig. 1 of the plate differs from the specimens of section 1 merely in having the light coloured spur (which extends from base of f. w. and is a rudiment of the longitudinal stripe of *Petrosa*) extended to greater length; in other respects it is *Scudderi*. Fig. 7 has this basal spur as in *Scudderi*.

Section 2 contains 16 intergrades very close to *Scudderi*. Some are like fig. 1 of the plate, some have the longitudinal stripe of f. w. prolonged nearly to a junction with the oblique bar, a few have slightly developed light markings on hind wing. In several examples the oblique bar on f. w. is largely produced, and on basal side projects a branch backward toward the systematic point of junction with the longitudinal stripe, although this stripe is only developed to the extent of a short basal spur. In section 3 are 20 intergrades near to *Scudderi*, but having usually a well defined light pattern on h. w., as in figures 3 and 7 of the plate. Section 4 comprises 7 very characteristic intergrades nearer to *Scudderi* than to *Petrosa*. Fig. 5 stands for this section, and is nearer than the rest of section 4 to the character shown in section 3. The other 6 specimens in section 4 appear to form a progression in pattern of h. w. away from fig. 5 in the direction of *Petrosa* (fig. 16). This progress, however, does not consist of sharply defined gradations like the h. w. pattern steps seen in figures 8 and 4, which figures so normally lead toward fig. 16. In the progression formed by these 7 specimens, the h. w. black area, extending in fig. 5 from the central white band to the base of the wing, becomes in the other specimens increasingly indefinite and finally nebulous, as if the black were eliminated atom by atom without any definite pattern evolution. In the 7th term of this progression, the h. w. is practically like that of fig. 2, except that the basal part of the wing, in addition to the two black streaks seen in fig. 2, has also a slight haze of black scales. This 7th term, however, is not as to f. w. a typical *Petrosa*, for the longitudinal stripe is extremely tenuous at its end next the oblique bar. In the other 5 specimens the longitudinal stripe is scarcely more developed than in fig. 5 of the plate. Section 5 has 10 intergrades, very uniform, decidedly nearer to *Petrosa* than to *Scudderi*. They come between fig. 11 and fig. 8, but nearer the latter. Section 6 is formal *Petrosa*, consisting of 41 specimens. Figures 2, 6 and 16 exemplify this section, fig. 16 being the dominant local form. In section 6 variation is subordinate to a general equality or maturity of pattern.

Sections 1, 2 and 3 are not in the slightest degree distinct in a systematic sense. Together they number 50 individuals, constituting the form *Scudderi* with its inseparable variations. Section 4 agrees in system with the previous section, but between the two masses there is an appearance of discontinuity. In case fig. 5 and another specimen were

lacking, a rather broad gap between sections 4 and 3 would result. Even in that case, the systematic unity of pattern would remain evident. Section 5 accords entirely in system with section 6, yet it happens that actual intergrades between them are extremely scarce, so that these two bodies of variation are also nearly isolated from each other. The only intermediates between sections 5 and 6 are figures 8 and 4 and a single additional specimen; all three are bred specimens—"missing links" are not always so easily obtained.

Sections 5 and 4 are not visibly harmonic. Between them exists a break of continuity by lack of intergrades, and this break resembles a systematic partition, from the fact that the methods of pattern growth in the two series appear discordant. Although the section 5 pattern is more like formal *Petrosa* than is the pattern of section 4, yet a higher stage of the method of section 4 reaches practically the *Petrosa* pattern without in transit assuming the section 5 pattern, or so it seems. It is a fact that section 5 shows more plainly its alliance with sections 2 and 3 than with section 4, while section 4 more clearly manifests its alliance with section 6 than with section 5. Yet sections 4 and 5 undoubtedly belong in the relative positions mentioned. Study of the males alone does not relieve this apparent discord. The males matured indoor from estray pupæ, or from larvæ found wild and fed up, have not supplied any examples reconciling this lack of harmony. I have bred two considerable families from eggs, but it has singularly occurred in each instance that all the resulting males belong on the "*Petrosa*" side of this gap. Figs. 11 and 16 were from one lot of eggs, and although they are a good distance apart as to pattern advancement, yet they are plainly identical in method, fig. 11 being intergraded with fig. 16 by figs. 8 and 4, as also by section 5 and by some other specimens. Study of the females supplies convincing evidence that this apparent lack of harmony at one point in the series of flown males is not due to a systematic partition. In the series of females no corresponding discord is found. Also, we have in figures 12 and 17 direct evidence uniting the extremes of the general series. These two females were bred from the same lot of eggs which produced figs. 11 and 16. Fig. 12 is almost normal *Petrosa*. Fig. 17 may safely be considered a very moderate divergence from formal *Scudderi*. These two females efficiently unite the extreme terms of the series. The lack of unity between sections 4 and 5 is due mainly to the fact that there is a meagerness of representation at that part of the series of males. The

principal masses of individuals occur near the extremes of the pattern-distance, and the intermediate position is in comparison thinly occupied. A divisive attitude is manifested.

Additional to the flown males, my series contains 74 males matured in the house from estray pupæ or wild larvæ. Of these, 13 are *Scudderi;* 11 are intergrades very near *Scudderi;* 15 are somewhat more divergent, yet pretty near to *Scudderi.* One is a stage agreeing with section 4 of the flown males; 6 are nearer to *Petrosa* than to *Scudderi*, and intergrade closely with fig. 11 of the plate and with section 5 of the caught males, 5 of them being intermediate between fig. 11 and section 5, and the other 1 between section 5 and fig. 8 of the plate. Twenty-eighty are formal *Petrosa.* These 74, then, distribute as to pattern development in about the same numerical proportions as the caught males, and with a similarly feeble representation at the centre of the pattern-progress as compared with the extremes.

The caught females are but 25, all told. Of females matured in the house from wild larvæ and estray pupæ, there are 111. Total number of females, not including those bred from the egg, 136. Of these, 16 are *Scudderi*, 20 are intergrades very near *Scudderi*, 26 are more divergent, yet all pretty near to *Scudderi*; 9 are of composite pattern, combining in the same individual a considerable degree of *Petrosa* character, as to some parts of the pattern, with a predominant *Scudderi* tendency in other pattern elements; 9 are well-balanced intermediates between *Petrosa* and *Scudderi;* 18 are gradations near to *Petrosa;* 38 are formal *Petrosa.*

The females display a pattern sequence more even and harmonic than that of the males, with less tendency to break into divisions by lack of intergrades, and more fully sustained in the central part of the chain of variation. At the same time, the females vary as extensively as the males, and they exhibit at least an equal amount of aberration and as great a degree of inequality or oscillation in the progress of the several pattern constituents.

All through the range of variation, in both sexes, it is conspicuously evident that *Petrosa* is exceedingly unstable in regard to the relative development of the various elements of pattern. This is sufficiently illustrated in figures 3 and 5, also by figs. 9 and 11. The oblique bar of primary is the only element which approaches fixedness. The f. w. cell-

spot may be very small or very large, and may be isolated, joined to the oblique bar, or connected with the longitudinal stripe. The longitudinal stripe of f. w. is peculiarly vacillating. Sometimes it shows large development in an otherwise very dark wing, as seen in figs. 3 and 9; on the contrary, in some patterns it is but a mere basal spur, although the other light elements are highly conspicuous, as in fig. 5.

In the summer of 1888 three families were bred from eggs.

Progeny in family A.:

Males.—5 formal *Petrosa;* fig. 16 of the plate is one of them. One intergrade, somewhat nearer to *Petrosa* than to *Scudderi* in the method of its pattern, but at least as near to *Scudderi* as to *Petrosa* in degree of development of pattern; this is fig. 11 of the plate.

Females.—3 nearly formal *Petrosa;* fig. 12 is one. Ten intergrades, all nearer to *Scudderi* than to *Petrosa*, of which the one nearest to *Scudderi* is fig. 17 of plate.

Progeny in family B.:

Males.—One, formal *Petrosa.* Two, near *Petrosa.* Six, a little nearer to *Petrosa* than to *Scudderi*, and all much alike.

Females.—One, nearly formal *Petrosa.* Seven, a little nearer to *Scudderi* than to *Petrosa*, and all much alike. Three, nearly *Scudderi.*

Family C.—Eggs from a female of extreme *Petrosa* characters. Resulting progeny, 3 composite males, *Scudderi* as to hind wing, but with f. w. approximating *Petrosa* nearly in equal degree to the f. w. of fig. 11. Two of them are precisely the form "*Geometrica*," as figured in Plate 2, Proc. Ent. Soc., Phil., Vol. 4, 1865. The third specimen differs by having a single small white dot on each hind wing.

A question has been raised whether *Nemeophila plantaginis* occurs in North America. At Laggan, *Plantaginis* is not found. The local *Petrosa*, throughout its immense range of variation, is at no point of its pattern-sequence coincident with *Plantaginis.* Of the latter I have compared a small but broadly geographical series. The typical *Plantaginis* from Saxony is a larger form than our moth of the Bow Valley, and is besides a far more gorgeous affair, with hind wing black and red in the ♀, black and saffron in the ♂. The type form from polar Norway is smaller, but retains nearly the same pattern, and in my examples the colours are but little toned down. From northern Finland I have a pair,

representing still the typical form, but with the brilliancy of the colours greatly reduced; these are smaller than most local *Petrosa*, and the ♀ is not more brightly coloured, but the ♂ has the tawny yellow ground of hind wing, never found here in male *Petrosa*. From Saxony, from polar Norway, and from northern Finland, I have the male form *Hospita*, in which the saffron or tawny yellow ground of h. w. is replaced by white; this form approaches the local ♂ *Petrosa* by a practical concord of colours. Fig. 10 of the plate represents *Hospita* male from northern Finland. *Hospita* is the nearest phase of *Plantaginis* to the Bow Valley *Petrosa* male. Fig. 15 represents my only Asian instance of *Plantaginis*, a ♀ from eastern Siberia, an example nearer of kin to the Laggan *Petrosa* ♀ than any other *Plantaginis* I have seen. One local female corresponds so closely to this Amour *Plantaginis* that they are separable by a single character only. This final point of distinction is the apical element of the light pattern of primary, the light coloured marking near apex of f. w., exterior to the oblique bar. The apical element seems to be persistent in *Plantaginis*, but in the local *Petrosa* it is only occasionally seen, and even when present is in most cases rudimentary in degree. Fig. 14 illustrates an extreme development of *Petrosa*, in which the apical inscription is blended with the oblique bar. Even in extreme stages of the *Petrosa* pattern the apical element is usually absent. It appears sometimes in intergrades very near to "*Scudderi*." Occurrence or lack of this character, and the degree of its development when present, appear not to be correlated to the degree of advancement of the general pattern. The extensive material before me strongly supports the view that *Petrosa* and *Plantaginis* are distinct species.

Aside from the two *Plantaginis* figures, the plate represents a single species. This conclusion is derived from examination of the caught series, and independently proved in the families bred from eggs.

NOTE.—As the Entomological Society of Ontario supplied the plate, Mr. Bean generously presented the specimens from which it was made to the Society's collection. H. H. L.

PREPTOS, TAMPHANA, AND AROTROS.

In the February number of the CANADIAN ENTOMOLOGIST, Mr. Dyar very justly complains of the inadequacy of my descriptions of the above genera in the Proceedings of the Zoological Society of London, for 1892. Both Preptos and Tamphana belong to the Eupterotidæ. Preptos is most closely allied to the Eastern genus Tagora, Walk., and differs in the following particulars:—Primaries with veins 5 and 6 from upper angle of cell, discocellulars angled outwardly and then inwardly close below vein 5; secondaries with discocellulars very oblique. No allied forms of *Preptos oropus* have as yet been discovered in America, although the species has been redescribed as *Tagora corax*. Druce, Proc. Zool. Soc., London, 1893.

Tamphana is allied to Tarchon, Druce and Apatelodes, Packard, but the wing shape and lateral abdominal tufts distinguish the genus at once, and I shall give full details of the neuration in a paper I am preparing on Walker's American types at Oxford. Arotros belongs to the Bombycidæ; the neuration only differs from Bombyx, Hubn., in having vein 8 of the secondaries rise from the cell at a third of its length from the base, but the shape of the wings is quite different. In locating the above genera I follow the arrangement of Mr. Hampson, as Messrs. Neumoegen and Dyar place the Bombycidæ under the group of families with a frenulum, whereas Bombyx, the typical genus, has no frenulum.

W. SCHAUS, Twickenham, England.

THECLA ONTARIO, EDW.

In a small collection of butterflies sent to me for identification, I find a good example of this very rare Hair-Streak, which was taken by Mr. William Metcalfe, of Toronto, at Grimsby, on 24th of June, 1894. This record is important, as it is the first one of an exact date and locality. Mr. Metcalfe states that the exact spot was along the Grand Trunk Railway track, near Grimsby Park, at the back of Mr. Harry Griffith's farm. The specimen in question is a male in good condition, although slightly stained with cyanide on the upper side. The figure given by Mr. W. H. Edwards (in his Butt. N. America, I., pl. 2, *Thecla*) represents this specimen admirably, although slightly larger. Mr. Metcalfe's specimen expands 22 mm., and has the orange spot on secondaries above only faintly indicated by a few rusty scales.

J. FLETCHER.

ON THE TERM CYDOSIINÆ.

BY A. RADCLIFFE GROTE, A. M., BREMEN, GERMANY.

In my check list, New York, May, 1882, I first proposed the collective term *Cydosiinæ*, having for its sub-family type the well-known *Cydosia nobilitella*. I associated with it *Penthetria*, Hy. Ed., not from any study of this genus, unknown to me in nature, but merely on the strength of certain of Mr. Edwards's remarks. This latter genus, under the name *Tantura*, Kirby, is now referred to the *Lithosiidæ* by Neumoegen and Dyar, and probably correctly. I excluded the genus *Oeta*, previously referred here, as I believed it to belong to the *Tineidæ*, as indicated by Zeller. To this sub-family *Cydosiinæ*, Grote, the genus *Cerathosia* is also referred by Neumoegen and Dyar, following Smith's more recent opinion. In 1882, I regarded *Cydosia*, then, as the type of a sub-family of arctiiform *Zygænidæ*. In 1893, Dyar regards it as the type of a sub-family of zygæniform *Arctiidæ*. This is the amount of the difference; but, in any event, I may point out that the term *Cydosiinæ* belongs to me. And I do not expect that the last word as to its family position has been said. In his Preliminary Catalogue, CAN. ENT., XXI., 169, Mr. Smith refers the genus *Gnophaela* to the *Arctiinæ*, p. 172. This genus, according to Neumoegen and Dyar, belongs to the *Pericopidæ*. The genera, previously regarded by me as arctiiform *Zygænidæ*, following Dr. Packard, under the term *Glaucopes*, are now divided into two families: *Zygænidæ* and *Pericopidæ*, excluding the *Cydosiinæ*. For the genera, referred by me to the *Castniares*, the distinct family *Agaristidæ* is retained. This seems to be the amonnt of the difference. In any event, I point out the fact that, up to quite recently, Dr. Packard had not abandoned his view of the family solidarity of his family *Zygænidæ*, and that this certainly was not the case in 1882; hence any criticism of my list, based on more recent discoveries, is totally irrelevant. On the contrary, my list offers a term *Cydosiinæ*, of which the most recent classification (1893-4) avails itself. Further, Mr. Smith refers, in 1889, *Melanchroia* to the *Arctiinæ*. No one else, I believe, has ever placed it there, nor has it stayed there long. This placing of *Gnophaela* and *Melanchroia* among the *Arctiinæ* might indeed provoke an unfriendly criticism, but a little reflection shows that all such mistakes are in due course corrected as we add to our knowledge of structure. Already in 1891 the two genera suddenly

disappear from the *Arctiinæ*, to appear in the *Pericopidæ* of the Philadelphia List. In the next List to be published it seems likely that *Melanchroia* will submit, with similar celerity, to a third *changement de place.*

As to the position of *Cerathosia*, Dr. Packard says: "The occurrence of such [glandular] hairs in this genus [*Cerathosia*] is interesting, from the fact that they have not yet been observed in the Arctians, to which this moth has been referred, nor in the *Noctuidæ*, among which it should be placed, since no Arctians have, when hatched, smooth glandular hairs." Proc. Bost. S. N., Hist, xxv., 109, 1890. The citation of this genus in a synoptic table does not of itself constitute a proof that it is correctly classified.

SOME NEW ATTIDÆ.

BY NATHAN BANKS, SEA CLIFF, N.Y.

Phidippus borealis, nov. sp.

Length, 13. mm.; ceph., 4.2 mm. long, 3 mm. wide. Cephalothorax very dark brown, covered with black hairs, clypeus with white hairs, and some white scales on the lower sides; a bunch of stiff hairs behind the eyes of second row; mandibles red-brown, iridescent greenish near tip; sternum brown with black hairs. Abdomen black, a narrow basal line of white, and broad side stripes of white which do not quite reach to the tip; just beyond the middle the side stripes indent the central black area; sides black and venter blackish; legs black, bases of metatarsi reddish. The cephalothorax is moderately high, narrower than in the allied species, the quadrangle wider behind, the anterior row much curved, the S. E. small and well separated from the M.E., the eyes of second row almost twice as near to the lateral as to the dorsal. The posterior metatarsi are more slender than usual, and spined only at tip. The region of the epigynum is nearly circular in outline, with a deep rounded excision behind, and two quite widely separated openings in the anterior portion. Two females; Crawford Notch, White Mts., N.H. (Mrs. Slosson). Differs from allied species *(rufus, mystaceus)* in the narrower cephalothorax, markings of abdomen, etc.

Dendryphantes bifida, nov. sp.

Length, ♂, 4 mm.; ceph., 1.8 mm. long, 1.2 mm. wide; ♀, 4.2 to 5 mm. long. Cephalothorax reddish, black around eyes, some long white hairs on clypeus; mandibles red-brown; sternum dark brown or black; legs yel-

lowish, femora mostly black in the male, anterior legs of female reddish, patellæ and tibiæ of other legs reddish or with red bands. Abdomen red-brown, in male with four black spots each side near tip, in female a black stripe each side with three pale spots, as in *D. flavus*, sometimes a pair of pale spots near base ; venter pale with three dark brown or black stripes. In structure similar to *D. flavus* and *D. montanus*, but the mandibles are not enlarged as in those species, and the size is much smaller. The male palpus is similar to *D. montanus*, but with a smaller tibial hook, a smaller striate upper portion of bulb, and with a tube yet stouter and deeply bifid at tip. The epigynum has a triangular excision behind, and a deeply lunate dark patch in front. Several specimens ; Olympia, Washington (T. Kincaid).

Attus dorsatus, nov. sp.

Length, 3.5 mm. ; ceph., 1.5 mm. long, .95 mm. wide. Cephalothorax red brown, eye-region blackish, a narrow median light stripe extending from the dark of eye-region to the hind margin of the cephalothorax, also a light stripe each side from just below the dorsal eyes to the hind margin, a few whitish hairs around anterior eyes, abdomen above and below a uniform gray, sternum and legs brownish yellow, latter with ends of the joints darker, mandibles reddish. Cephalothorax but little shorter and narrower than the abdomen, barely wider behind the eye-region than in front, eye-region as wide behind as in front, eyes of second row a little nearer dorsal than lateral eyes. Fourth pair of legs much the longest, first the next ; tibia IV. twice as long as III., anterior coxæ separated by more than width of lip ; metatarsi IV. spined throughout. The epigynum consists of a depressed area, broadly rounded in front and longer than broad, at the anterior end there are two square holes, and from them extend behind on each side a clavate body, enclosing between their tips two elongate holes. One specimen ; Southern California.

Attus morosus, nov. sp.

Length, 4.5 mm.; ceph., 2.1 mm. long, 1.4 mm. wide. Eye-region blackish, thoracic part reddish, a median white line ; dorsum of abdomen brown, a pair of large black spots on anterior part, on the anterior edge of each is a small white dot, behind them there is a broad, triangular, transverse area of white with three brown chevrons, a large black spot each side terminating the two posterior chevrons, behind them is a white band and a narrow black band just above the spinnerets ; sides lineated

with brown and white; venter pale, with a large light brown spot; sternum blackish, pale on the margins; legs brownish, paler at tips, posterior pair indistinctly ringed. Cephalothorax as usual, quadrangle of eyes equally wide in front and behind, eyes of second row half-way between dorsal and lateral eyes. Fourth pair of legs much longer than third; anterior coxæ separated by more than width of lip; metatarsi IV. spined throughout. The epigynum consists of a circular depressed area, divided by a broad septum, much broader behind than in front, where on each side there is a small dark spot. One female; Olympia, Washington (T. Kincaid).

Icius obliquus, nov. sp.

Length, 2.8 mm.; ceph., 1.2 mm. long, .8 mm. wide. Cephalothorax yellowish-brown, eyes connected by a black band, extending behind and enclosing the dorsal eyes, a few of the radial furrows partly black, margin black; abdomen yellowish, a few brownish chevrons near the tip, sides with oblique blackish lines, venter suffused with black, two rows of yellow spots; sternum yellowish, black on edge; legs yellowish-brown, anterior pair stoutest and darkest, with a few black patches, palpi similar, mandibles yellowish, black near base. Sides of cephalothorax almost straight, slightly narrowed behind; eye-region wider in front than behind; eyes of second row about half-way between dorsal and lateral eyes. Anterior coxæ separated by more than width of lip; fourth pair of legs longest, third nearly as long as first; the three pairs of spines on tibia I. are very long, metatarsus IV. spined only at tip. The tibia of palpus has no projection, the lower part of palpal organ is large, the upper portion is cut off from that below by a transverse furrow and is twice as wide as long; the tube is slender, but slightly curved and projects into a large circular cavity in the upper portion of the tarsus. One male and one young female; Olympia, Washington (T. Kincaid).

Icius monticola, nov. sp.

Length, 4 mm. ♂. Cephalothorax red-brown, black on margin and in eye-region, clothed with white scales; a median row of stiff bristles just above anterior eyes. Legs yellow-brown, the femora darker; on posterior pairs a black ring at base of tibia, metartarsus and tarsus; clothed with long black hairs and shorter white scales; palpi red-brown, clothed with white scales; sternum dark red-brown; abdomen blackish (but somewhat discoloured), clothed above with white scales, and below with fine hairs. Cephalothorax moderately long, low and flat, broadest in

middle, eye-region one and one-half times as wide as long, equally wide in front and behind; the A. M. E. large, nearly touching, the eyes of second row a little nearer to A. S. E. than to dorsal eyes. Mandibles small and weak; sternum narrow; anterior coxæ separated by more than width of labium; leg I. barely longer than leg IV.; femora, patella, and tibia enlarged; metatarsus IV. spined only at tip. Palpi short, the tarsus truncate at tip, tibia with a short straight-pointed projection on outside, lower part of palpal organ very much swollen, almost pointed, upper part short, tube short, bent upon itself. A male; near Livermore, Colo. (C. F. Baker.)

Icius minutus, nov. sp.

Length, 2.5 mm.; ceph., 1.1 mm. long, .75 wide. Cephalothorax red-brown, eye-region black, abdomen dark gray, with a few narrow light chevrons on the posterior part; legs white, annulate with black, the femora partly suffused with fuscous, sternum dark gray, venter pale, a median and two broader lateral gray stripes, palpi white, distal joints a little enlarged, mandibles yellowish. Cephalothorax widest behind the middle, eye-region a trifle narrower behind than in front, legs short, fourth pair wanting, third as long as the first, second shorter, anterior coxæ separated by more than width of labium. Abdomen one and one-half times as long as the cephalothorax. A quite prominent bristle arising from between anterior median eyes. The epigynum has, in the posterior portion, two very large contiguous circular depressions; and two very much smaller holes, slightly separated, in the anterior portion. One female; Olympia, Washington (T. Kincaid).

Icius floridanus, nov. sp.

Length, 3 mm. Cephalothorax dark yellow-brown, darker in eye-region, clothed with yellowish or golden scales, especially near eyes; mandibles yellowish; sternum blackish. Legs pale yellowish with a black stripe on anterior and one on posterior sides of patella, tibia and metatarsus, anterior femur blackish, rest of anterior leg reddish, with the usual black stripes. Abdomen black, with a band of white scales at base, above with dark, somewhat coppery scales, below with white hairs. Cephalothorax quite short and broad, sides but little rounded, low and nearly flat, eye-region nearly twice as wide as long, a little wider behind than in front; eyes of second row closer to lateral than to dorsal eyes. Mandibles quite large, with a black tooth behind fang; sternum short, triangular; anterior

coxæ separated by width of lip; leg I. longest and stoutest, but not much longer than leg IV., metatarsus IV. spined only at tip. The palpus is long and slender, a short curved spine at tip of tibia, the tarsus fully twice as long as broad, palpal organ but little convex, divided transversely and the upper part bilobed, behind one of these lobes arises the long and slender tube, which curves toward the middle and extends into a furrow in the upper part of tarsus. One male from Punta Gorda, Florida (Mrs. A. T. Slosson).

Icius similis, nov. sp.

Length, 4.1 mm.; ceph., 1.6 mm. long, 1.1 mm. wide. Cephalothorax with sides and thoracic part reddish, with a few white scales and a marginal stripe of white; eye-region black, posterior part iridescent; clypeus with white hairs; a ridge of white or yellowish hairs above the first row of eyes; mandibles, legs and sternum reddish, the latter darker than the other parts; the legs have a black stripe above and one on each side of patella, tibia and metatarsus; the posterior metatarsi are almost wholly black. Abdomen black, covered with pale scales, not or but slightly iridescent.

In structure and coloration this is similar to *I. elegans*, Hentz, but the scales are not as iridescent, there is no pale line around the abdomen of the ♀, the legs are more reddish, the ♂ has no brush to tibia I., the tube of palpus much stouter; the ♀ is but little larger than the ♂. The epigynum has a small median rounded excision in the posterior margin; and two oval holes, about their diameter apart, in front. Several specimens from Olympia, Washington, and from Ft. Collins, Colo. Prof. Emerton, in his N. Eng. Attidæ, mentions what is probably this species as a variety of *Icius elegans*.

Icius sexmaculatus, nov. sp.

Length, 3.5 mm.; ceph., 1.4 mm. long, .85 mm. wide. Thoracic part black, with some golden hairs on the anterior edge; sides and thoracic part reddish, mandibles reddish brown; sternum yellowish; dorsum of abdomen red-brown with blackish patches, and with six white spots, two transverse basal ones, two larger, median, more circular ones, and two small preapical ones; beyond the middle pair a few indistinct pale chevrons; legs pale yellowish, anterior pair more reddish, especially femora and bands on patellæ and tibiæ; palpi pale; sides of abdomen red-brown; venter pale, with a brown line each side. This species is similar to *I.*

lineatus; the cephalothorax is the same, though perhaps a trifle higher and the dorsal eyes slightly farther apart; otherwise the structure is like that species. The tibia of the palpus has a short black spine at tip, the tarsus is much narrower than in *I. lineatus* and the palpal organ quite simple, the lower part is large and projecting, the upper part striate and with a short, stout apical tube; there is on the outer side the outline of a curved tube pointing down toward the tibial spine. One male; Washington, D.C.

Saitis parvulus, nov. sp.

Length, 3 mm.; ceph., 1.4 mm. long, 1.05 mm. wide. The eye-region black; the thoracic part reddish, with two black spots on the posterior margin; the palpi and first legs black, the second legs mostly black; other pairs yellowish, no black spots as in *S. pulex*; the mandibles red-brown; the sternum yellowish-brown; the abdomen black above, with a broad white stripe, broadest at the middle, beginning just before the middle it contains five broad black chevrons; venter yellowish, with a median black spot and two black stripes. Similar to *S. pulex*, but the cephalothorax is shorter and the eye-region is proportionately broader, the quadrangle being a little narrower behind; the palpus is much smaller, the tibia has not the long, thin projection, nor a broad lobe below, but a moderate, curved black process; the bulb of palpus has a swollen part not seen in *S. pulex*. One male from a deep and cold swamp near Ithaca, N. Y.

Habrocestum borealis, nov. sp.

Length, 5.5 mm.; ceph., 3. mm. long, 2. mm. wide. Cephalothorax black, in a strong light the thoracic part showing slightly reddish; the sides with white scales, which on the margin form a distinct white line; above anterior row of eyes is a crest of long black hairs; sternum black, sometimes pale in the centre; coxæ mostly black, sometimes posterior ones pale at base; palpi black, except the tibia and tarsus, which are pale; anterior pairs of legs mostly pale, with a few black patches on femora and tibiæ; posterior legs mostly black, the tarsi pale, and the patellæ, tibiæ and metatarsi are lineated with pale. The palpi have many white hairs or scales, and on the tarsi they are interspersed with long black hairs; there are white scales on the black parts of the legs. The abdomen is jet black, sides white, above with a white basal band and a band crossing the dorsum just before the middle and curving to meet the white sides; just above the spinnerets is a pair of white dots, and in front of these a median white spot, sometimes elongate. The structure

is similar to the other species of the genus ; there is a horny spot on the base of the abdomen. The palpus is similar to *H. cœcatum*, but is not so broad ; the tibial projection is much longer and the tube is not so stout. There is no projection at the tip of patella III. Several males, from Franconia, N. H. (Mrs. A. T. Slosson).

Habrocestum clypeatum, nov. sp.

Length, ♂, 4.7 mm. Cephalothorax yellowish in front, black on sides and a short median stripe from behind ; clothed with tawny scales ; a curved band of white scales just above first row of eyes, surrounding the eyes of second row and passing below the dorsal eyes and extending behind toward the posterior margin ; a stripe of white scales near each lower margin ; clypeus black, a few white hairs in centre and on mandibles, and a prominent elongate vertical spot of white scales under each side eye. Leg I. black, except metatarsus and tarsus which are pure white, clothed with white scales, those under the tibia extremely long and pedicellate ; basal joints of leg II. blackish, with white scales ; legs III. and IV. brownish-yellow, femora blackish at base, with white scales and black hairs ; sternum pale. Abdomen black above, a basal band of white and a white median stripe behind ; sides and venter pale, the latter with two black stripes. Of the usual structure of the genus, leg III. simple. Palpus broad, much like that of *H. agilis*, Bks. (*auratum*, Peck., not Hentz.), but the tibial projection is much stouter, and the long tube starts nearer to the tip of bulb. One male ; Dixon's Canon, Colo. (C. F. Baker).

Zygoballus iridescens, nov. sp.

Length, 4.1 mm. ; ceph., 1.8 mm. long, 1.4 mm. wide. Eye-region black, thoracic part reddish, both with whitish hairs and scales. Anterior femora black, black stripe above and on inner side of patella and tibia I., rest of legs pale yellowish, without any spots. Mandibles and mouth parts red-brown ; sternum black. Abdomen black, clothed above and on sides with iridescent scales and long hairs ; venter black, hairy, and with two indistinct rows of pale spots. Structure in general similar to *Z. bettini*, but the mandibles are not quite so large ; and the sternum is much broader, not narrowed in front, so that the anterior coxæ, which are not as long as in *Z. bettini*, are more widely separated. The region of the epigynum is red-brown, and is semicircular in outline ; showing four pale spots, two in front close together, and one in each posterior corner. Franconia, N. H. (Mrs. Annie T. Slosson).

SYNOPSIS OF THE DIPTEROUS GENUS PHORA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

In Osten Sacken's well-known Catalogue of Diptera ten species of Phora are credited to our fauna. Of these I have been unable to find any Phorid described by Fabricins under the name of *atra*. The author who first used this name appears to have been Meigen; in his Klass. Besch. Eur. Zwei. Insect (1804), this author describes a *Trineura atra*, but in his later work (Syst. Besch. Eur. Zwei. Insect, 1830) this name is relegated as a synonym of *Musca aterrima*, Fabr. (Ent. Syst., 1798). In the recent revision of the Austrian Phoridæ, by Strobl (Wiener Ent. Zeitung, 1892, pp. 193-204), no mention is made of a *Phora atra*, Fabr. The reference in the Catalogue should therefore be credited to Meigen, and transferred as a synonym of *Trineura aterrima*, Fabr.

Phora fuscipes, Macq., has been credited to our fauna by Walker, but from Macquart's three-line description it is quite impossible to identify the species, and the name should therefore disappear from our list. The form doubtfully referred to this species by Zetterstedt does not occur in our fauna so far as I am aware.

Since the publication of the above mentioned Catalogue, descriptions of five supposed new species of Phora from our fauna have been published, viz.: *aletiæ*, Comstock (Cotton Insects, 1879, pp. 208-211), and four other species by Prof. Aldrich, in the CANADIAN ENTOMOLOGIST, Vol. XXIV., pages 142-146. Although I have not seen an undoubted type of *Phora aletiæ*, Comst., still there is every reason for believing that it is identical with the common *Phora nigriceps*, Loew. The described female was evidently immature, which would account for the darker markings on the abdomen mentioned in the description; in the male, however, it is stated that the "dorsal portion of the abdomen is entirely blackish," and this accords perfectly with the colouring of this part of the body in normally coloured specimens of *nigriceps*. Moreover, this latter species has been repeatedly reared from larvæ feeding upon the decomposing chrysalides of Aletia, thus having similar habits to the form described by Prof. Comstock.

So far as at present known, the larvæ of all the different species of Phora feed upon animal or vegetable substances in a more or less state of decay. In Prof. Aldrich's paper mentioned above the statement is made that several of the species were reared from Cimbex cocoons, but in a recent letter the author states his conviction that these cocoons contained only dead larvæ and pupæ at the time they were attacked by the Phorids.

Four European species, not heretofore known to occur in our fauna, have recently been recognized by the writer, viz: *femorata*, Meig., *interrupta*, Zett., *mordellaria*, Fall., and *fasciata*, Fall. There are also four apparently undescribed species occuring in this country, and these will be found duly characterized below. Our species may be tabulated as follows:

Second heavy vein of wings simple, not forked near the apex; head and body black.

Frontal setæ next the antennæ pointing downwards; tibiæ destitute of setæ on the outer side; palpi and halteres yellowish..... *cocciphila*, n. sp.

Frontal setæ pointing upward; front and hind tibiæ each bearing one, the middle tibiæ two setæ on the outer side near the base; halteres black.

Palpi and antennæ black..... *femorata*, Meig.

Palpi yellowish.

Antennæ black..... *mordellaria*, Fall.

Antennæ yellowish-red..... *clavata*, Loew.

Second heavy vein forked near the apex.

Middle tibiæ each bearing two or three setæ on the outer side near the base; frontal setæ pointing upward; head and thorax black.

Halteres, palpi and abdomen black; front tibiæ each bearing a single seta on the outer side near the base.

Hind tibiæ each bearing a seta on the outer side near the base and three smaller ones before the tip..... *cimbicis*, Ald.

Hind tibiæ destitute of setæ on the outer side... *pachyneuron*, Loew.

Halteres yellowish.

Palpi and abdomen black, front and hind tibiæ each bearing a single seta on the outer side near the base..... *microcephala*, Loew.

Palpi yellowish.

Hind tibiæ each bearing seven, the front ones three setæ on the outer side; abdomen black..... *spinipes*, n. sp.

Hind tibiæ each bearing two, the front ones each one seta on the outer side near the base; abdomen black.. *Luggeri*, Ald.

Hind and front tibiæ each bearing a single seta on the outer side near the base; abdomen velvet-black, the bases of the segments partly or wholly yellow..... *venusta*, n. sp.

Hind tibiæ destitute of stout setæ on the outer side, the front ones each with three or four; abdomen black, the apices of the segments sometimes narrowly yellow... *incisuralis*, Loew.

Middle and other tibiæ destitute of stout setæ on the outer side, at most bearing short bristly hairs; frontal setæ next the antennæ pointing downward.

Thorax, palpi and halteres yellowish.

Head, antennæ and dorsum of abdomen largely or wholly black..... *nigriceps*, Loew.

Head and antennæ yellowish.

Abdomen yellow, a black fascia or pair of spots on the second and sometimes also on the third segment..... *fasciata*, Fall.

Abdomen yellow, the sides and a fascia near the hind margin of each segment, black..... *scalaris*, Loew.

Abdomen yellow, an interrupted black fascia on the base of each segment..... *interrupta*, Zett.

Thorax, head and abdomen black.

Halteres black, palpi yellowish..... *fungicola*, n. sp.

Halteres yellowish.

Palpi black..... *minuta*, Ald.

Palpi yellowish.

Tip of first heavy vein near the last fourth of the distance between the humeral cross-vein and the tip of the first branch of the second heavy vein; abdomen of male bristly..... *rufipes*, Meig.

Tip of first heavy vein nearly midway between the humeral cross-vein and the apex of the first branch of the second heavy vein; abdomen of male destitute of bristles..... *setacea*, Ald.

Phora cornuta, Bigot, from Cuba, is too imperfectly described to admit of giving it a place in this table.

Phora spinipes, n. sp.—Black, sub-shining, the palpi, halteres, front and middle tibiæ and a large portion of their femora, also the knees of the hind legs, yellowish; all frontal setæ pointing upward. Front tibiæ each bearing three setæ on the outer side of its basal three-fourths, middle tibiæ each bearing three setæ in a curved row on the outer side of its basal half, hind tibiæ each with seven setæ in an irregular row extending

nearly the entire length of the outer side. Wings hyaline, costal vein extending three-fourths the length of the wing, ciliate with rather short bristles; second heavy vein forked near its apex, tip of first heavy vein slightly beyond the middle between the humeral cross-vein and apex of the first branch of the second heavy vein; first slender vein curved near its base, then nearly straight, the cell in front of it scarcely wider than the narrowest part of the cell behind it; fourth slender vein distinct. Length, 4 mm. Hartford, Conn. A single specimen in my collection, taken April 30, 1893, by Mr. Stewart N. Dunning.

Phora cocciphila, n. sp.—Black, sub-shining, the under side of the third antennal joint and the palpi, yellowish; halteres whitish; front legs, including the coxæ, light yellow, the others brown. The four frontal setæ above the antennæ pointing downward, the others upward. Tibiæ destitute of stout setæ on the outer side. Wings whitish hyaline, costal vein not extending to the middle of the wing; ciliate with very short bristles, second heavy vein simple, not forked near the tip, apex of first heavy vein near the last fifth of the distance between the humeral cross-vein and the tip of the second vein; first slender vein nearly straight, the cell in front of it nearly twice as wide as the narrowest part of the one behind it. Abdomen bare in both sexes. Length, .75 to 1.25 mm. Twenty-five specimens in the collection of the Department of Agriculture, bred in October and November, 1894, from larvæ infesting dead adults of *Icerya purchasi*, collected by Mr. C. H. T. Townsend at Magdalena, Victoria, and Tamaulipas, Mexico.

Phora fungicola, n. sp.—Black, sub-shining, antennæ and halteres concolorous, the palpi and legs, including the front coxæ, yellowish. The four frontal setæ above the antennæ pointing downward, the others upward. Tibiæ destitute of stout setæ on the outer side. Wings hyaline, costal vein extending to the middle of the wing, ciliate with short bristles, second heavy vein forked near the apex, tip of the first heavy vein near the last third of the distance between the humeral cross-vein and apex of the first branch of the second vein, first slender vein gently curved its whole length, the cell in front of it scarcely wider than the narrowest part of the one behind it. Abdomen bare in both sexes. Length, 1 to 1.5 mm. Ten specimens in the collection of the Department of Agriculture, bred by T. D. A. Cockerell, Las Cruces, New Mexico, from larvæ infesting a tree-fungus, *Trametes Pecki*, which was inhabited by Coleopterous insects belonging to the genus *Cis*.

Phora venusta, n. sp.— ♀ Head and thorax black, sub-shining; antennæ yellowish-brown; palpi, halteres and legs, including the coxæ, yellow. Abdomen opaque velvet-black, the broad bases of the second and sixth segments and a triangular dorsal spot at the base of the third, fourth and fifth segments, yellow; venter also yellow. Frontal setæ pointing upward. Front tibiæ on the outer side each bearing one, the middle tibiæ with two stout setæ near the base, hind tibiæ destitute of setæ on the outer side. Wings hyaline, costal vein extending to the middle of the wing, ciliate with minute bristles, second heavy vein forked near the apex, the tip of the first heavy vein near the last fourth of the distance between the humeral cross-vein and the tip of the first branch of the second vein; first slender vein nearly straight, the cell in front of it sub-equal in width to the one behind it. Length, 1 mm. Boston, Mass., Sept., 1868. A single specimen in the National Museum. I am indebted to the Curator for the privilege of studying the fine series of specimens contained in the collection of that institution.

PREPARATORY STAGES OF EUCLIDIA CUSPIDEA, HUBN.

BY JOHN B. LEMBERT, YOSEMITE, CAL.

Egg.—Pea-green colour; round, with deep longitudinal lines from the top to the bottom. Deposited in twos and threes up to as many as eight or nine at one laying before flying away. The eggs change next day to a mottled gray colour, resembling the dried plant stalks on which they are laid. They are not deposited directly on the food plants, which are lupin and clover. They hatch out in nine days.

Larva, first stage.—A slender looper. Head quite large and bilobed. Light green from the head to the first segment back of the thoracic legs, which are six in number; thence dark green to the segment joining the four abdominal legs, lighter beneath; remainder of body light green. Length, about 6 mm.

The second change escaped my notice, as the larvæ were always moving and must have taken but a short time to effect it; the whole surface of the body became concolorous and of a light green. On the twelfth day they were very quiet; fine white and black lines could be seen along the sides. After this they would raise themselves up, put their heads between the thoracical legs, then twist around, open their mouth parts as if in the act of biting or covering their bodies with a fluid; suddenly they disappeared. Seven days afterwards I examined the leaves of the food plants and found one curled up in a web; taking it for granted that it was prepared to hibernate, I put the jar away for the season.

Subsequently I found that I was mistaken on this point, and that I had introduced with some clover a Hemipterous enemy which destroyed my larva.

PRELIMINARY STUDIES IN SIPHONAPTERA.—III.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (continued.)

DIVISION II.

Mandibles short, not reaching ends of anterior coxæ; spines in pronotal comb, 14 to 26. Group 1.

Mandibles long, reaching to or beyond ends of anterior coxæ; spines in pronotal comb, 16 to 20. Group 2.

TABLE OF SPECIES OF GROUP 1.

Spines in pronotal comb, 14 to 20 ..... A.

Spines in pronotal comb, 24 to 26; hind femora with a row of minute bristles on side; first two or three abdominal segments with minute teeth on disc above; first claspers of male without short black teeth; bristles on second antennal joint shorter than third joint; length, 3–3.5 mm.; colour dark brown ..... *avium.*

A. Abdominal segments each with one row of bristles; eyes very large, longer than third antennal joint, the upper edge extending above middle of head; bristle on second antennal joint reaching to end of or beyond third joint; maxillary palpi with joint 2 shorter than 4 in male, as long as 4 or longer in female; head in female evenly rounded from occiput to mouth, in male flat on top, rounded in front; pronotal comb of 14 spines; first two or three abdominal segments without minute teeth on disc above; in anterior tarsi joint 5 is as long or longer than 1 and 2 together and longer than 3 and 4 together; in middle tarsi joint 5 is three times 4 and as long as 2 or longer, while 2 is longer than 1 and as long or longer than 3 and 4 together; in posterior tarsi last three joints are very slender, 5 about equal to or shorter than 3 and 4 together, 2 equals three times 4, as long or longer than 5 and longer than 3 and 4 together, while 1 is much longer than 5 and nearly three times as wide; hind femora with a row of minute bristles on side; colour dark brown; length: male, 2 mm.; female, 2.25–2.5 mm. *glacialis.*

AA. Abdominal segments each with two rows of bristles; spines in pronotal comb, 16 to 20 ..... B.

B. Hind femora with a row of minute bristles on side; eyes small, near lower edge of head; antennal groove in anterior half of head; in anterior tarsi joint 5 is shorter than 1 and 2 together and shorter

than 2 and 3 together, but as long or longer than 3 and 4 together; in middle tarsi joint 5 equals twice 4, equals or is slightly shorter than 2, which is shorter than 1 and shorter than 3 and 4 together; in posterior tarsi joint 2 is less than three times 4, much longer than 5, and nearly as long as 3 and 4 together.....F.

BB. Hind femora without a row of minute bristles on the side; eyes small, near lower edge of head; antennal groove in anterior half of head; maxillary palpi in female with joint 2 more than three-fourths of 4; head in female evenly rounded from occiput to mouth; pronotal comb of 18 spines; colour light brown, sometimes darker dorsally.....C.

C. Abdomen more convex above than below, and without teeth on discs of first two or three segments above; bristles on second antennal joint shorter than third joint; bristles on abdomen as follows: first row on each side of dorsal segments with 4 or 5 bristles, second row with 6, ventral segments with 4 on each side; in anterior tarsi joint 5 is longer than 3 and 4 together; in middle tarsi joint 5 equals twice 4 and equals 1; in posterior tarsi joint 5 equals two-thirds of 2, is less than twice 4, and equals 3, 2 is slightly less than 3 and 4 together, while 1 is more than twice 5; colour light brown; length: female, 3 mm.....*Wickhami*, n. sp.

CC. Abdomen concave or very slightly convex above; with minute teeth on discs of first two or three abdominal segments above.....D.

D. Bristles on second antennal joint nearly as long as third joint; bristles on abdomen as follows: first row on each side of dorsal segments with 6 bristles, second row with 7, ventral segments with 4 or 5 on each side; in anterior tarsi joint 5 nearly as long as 3 and 4 together; in middle tarsi joint 5 is less than 1, about as long as 2 or shorter, and less than 3 and 4 together; in posterior tarsi joint 5 equals two-thirds of 2, equals 3, and is less than twice 4, 2 is less than three times 4, and 1 is more than twice 5; colour light brown; length: female, 2.5–3 mm....*Gillettei*, n. sp.

DD. Bristles of second antennal joint short; comparative lengths of tarsal joints not as above.....E.

E. Male claspers unarmed; head evenly rounded; first and second rows of bristles on dorsum of abdominal segments each with 7 bristles; in anterior tarsi joint 5 equals 3 and 4 together; in middle tarsi joint 1 equals 2, equals 5, and equals 3 and 4 together;

in posterior tarsi joint 5 equals 2, equals twice 4, and equals one-half of 1; colour light brown; length: female, 2–2.5 mm.; male, 3 mm..... *fasciatus.*

EE. Male claspers armed with short black teeth; head evenly rounded in female, flat above, rounded in front in male; first row of bristles on each side of dorsum of abdominal segments with 5 bristles, second row with 6, ventral segments on each side with 3 or 4; in anterior tarsi joint 5 as long or longer than 3 and 4 together; in middle tarsi joint 5 equals 1 or less, equals 2 or more, and equals 3 and 4 together or less; on hind tarsi joint 5 equals two-thirds to three-fourths of 2, equals twice 4, and equals 3 or more, 2 is less than three times 4, while 1 equals twice 5 or more; light brown, more or less dark dorsally on abdomen; length: male, 1.75–2 mm.; female, 2.25–2.5 mm..... *Howardii*, n. sp.

F. Bristles on second antennal joint shorter than joint 3; maxillary palpi in male with joint 2 nearly as long as 4; head in male flat on top, rounded in front; pronotal comb of 18 spines; first two or three abdominal segments without minute teeth on discs above; first and second dorsal rows of bristles on segments of the abdomen each with about 7 bristles on either side, ventral rows with about 4 on either side; first claspers in male with long heavy bristles, but without short black teeth; in posterior tarsi joint 5 about equals 3, while 1 is longer than 2, longer than 3 and 4 together and more than three and a-half times the length of 5; head, thorax and legs light brown, abdomen reddish brown; length: male, 3 mm..... *coloradensis*, n. sp.

FF. Bristles on second antennal joint longer than joint 3; eye very small, almost obsolete; maxillary palpi in female with joint 2 as long as 4; head in female evenly rounded from occiput to mouth; pronotal comb of 20 spines; first two or three abdominal segments with several short minute teeth on discs above; bristles on abdomen as follows: first row on dorsum of each segment with 12 to 14 on either side, second row with 11 to 12 on either side, each ventral row with about 6 on either side; in posterior tarsi joint 5 is shorter than 3, 1 nearly as long as 2 and 3 together and less than 3 and 5 together; uniform light brown; length: female, 2.5 mm..... *ignotus*, n. sp.

Pulex avium, Tschb.

1880. Taschenberg, Die Flohe, p. 70.

This species has quite an appalling synonymy. Dr. Taschenberg records it from a great variety of birds, including the domestic fowl. I have four specimens from Dr. Taschenberg, taken on *Sturnus vulgaris* in Germany, and a single specimen taken at Ames, Iowa, by Prof. Herbert Osborn—the host not given. It is recorded in Bull. 30 of the Texas Exp. Sta. as "common; very troublesome last summer at Bryan, Tex., on chickens." This determination was undoubtedly an erroneous one, the record probably referring to *Sarcopsylla gallinacea*.

Pulex glacialis, Tschb.

1880. Taschenberg, Die Flohe, p. 76.

I have received specimens of this species from Mr. A. B. Cordley, who took them on "cotton-tail rabbit," near the Grand Canon, in Arizona. The type specimens were from *Lepus glacialis*, "collected at the North Pole."

Pulex Wickhami, n. sp.

This species differs very widely in general appearance from any other Pulex I have seen. The abdomen in the two females before me is somewhat swollen and suddenly and strongly rounded back of the thorax. The swelling is not due to pregnancy, as the abdominal plates retain their normal relative position. My specimens are from *Sciuropterus volans*, and were collected at Iowa City, Iowa, by Mr. H. F. Wickham.

Pulex Gillettei, n. sp.

Closely related to *fasciatus*, though readily separated from it. Prof. C. P. Gillette took three specimens from Red Squirrel (*Sciurus canadensis*) at Portland, Mich.

Pulex fasciatus, Bosc.

1801. Bosc d'Antic, Bull. des Sci. par la Soc. Philomat. II., p. 156, No. 44.

I have seen nothing among the specimens examined that I could refer to this species as it is described and figured by Taschenberg. It was originally described from *Myoxus nitela* and *Talpa europea*. Kolenati found it on *Cricetus frumentarius*. Taschenberg records it from *Myoxus*, *Mus musculus*, *Mus decumans*, and *Canis lagopus*, in Europe, and without giving host, from Mammoth Cave, in Kentucky.

Pulex Howardii, n. sp.

I have received specimens of this species as follows: On Red Squirrel, at Ithaca, N. Y., from Mr. R. H. Pettit; on Squirrel, at Tallula Falls, Ga., from Mr. L. O. Howard (No. 5435); on "Gray or Fox" Squirrel, and in nest of field mouse, at Lincoln, Nebraska, from Prof. Lawrence Bruner; also several specimens from Prof. Herbert Osborn, at Ames, Iowa, the host not given.

Pulex coloradensis, n. sp.

The nearly parallel upper and lower borders of the abdomen in the single male before me, give it a somewhat peculiar appearance. It was taken from Fremont's Chickaree, at Georgetown, Colo, by Professor Lawrence Bruner.

Pulex ignotus, n. sp.

I have received two specimens of this species from Prof. Herbert Osborn, of Ames, Iowa. The host is not given.

[TO BE CONTINUED.]

MOUNTING INSECTS WITHOUT PRESSURE.*

BY R. W. RENNIE, LONDON, ONTARIO.

The mounting of insects (which are naturally semi-transparent) without pressure has always appeared to me to be a far more satisfactory method than the process so generally in use, viz., the soaking the specimen in liquor potassæ until clear, and then pressing it flat between two glass slips. The liquid partially, or wholly, destroys the internal organs, and the flattening process completes what the liquid failed to accomplish; that is, in so distorting the insect that the flattened skin on the slip but very remotely resembles the natural insect.

In mounting without pressure, some kind of a cell is necessary, and it can be obtained in various materials, such as ebonite, hard rubber, brass, tin, etc., but my own experience with cells of any depth cemented to the slip has been anything but satisfactory, for very often a fall, or even a slight jar, will separate the cell from the glass slip.

The cells that I use are the same that I described some three years ago at a meeting of this section, and up to the present time I have not found anything that answers all requirements so well, and yet is so easy to construct.

* Read before the Microscopical Section of the Entomological Society of Ontario.

For the benefit of those who were not present at that meeting, I will again describe the process of making:

The material used is beeswax, with a small quantity of resin added to increase the hardness and to raise the melting point. This mixture of beeswax and resin is kept heated almost to the boiling point; if the temperature falls much lower you will not be able to form a smooth cell. Place your slip on the turntable and set in rapid motion, then with a moderately thick brush apply a drop of the hot wax to the slip, which, being cold, cools the wax rapidly, rendering the cell visible at once; apply the wax drop by drop until the cell is a little deeper than is required for your material; allow it to cool thoroughly, and before removing from the turntable, take a sharp knife and trim it down to the proper thickness. You may also taper the outside of the cell towards the centre and the inside towards the circumference, leaving the base of your cell wider than the top, but always have your cell wide enough at the top, so that your cover glass will not come quite to the edge, leaving a small margin for the cement; a shallow depression may also be turned in the top to receive the cover glass. This cell answers for such mounting media as Canada balsam, or any glycerine jelly; but for media containing oil, it will be necessary to varnish the cell inside with some material that will not be acted upon by the mounting medium. These cells answer for almost any kind of material, if treated in the manner described, but when the mounting medium is of a very thin or watery nature, it is advisable to slightly heat the slip after you have your cell made and before turning it down, in order to make a perfect contact between the wax and glass.

For mounting transparent aquatic insects, take a cell of proper depth, transfer your insect to it with a small quantity of water, and add a drop of Pyroligneous acid; as soon as the acid reaches the insect it dies at once; place the cover glass in position, and after carefully absorbing any water that may have run over, cement down the cover.

Semi-transparent insects should be placed in a solution of Carbolic acid and Turpentine (one part of the former to three of the latter) and allowed to remain until clear. Ordinary crystallized Carbolic acid may be used in preparing this clearing solution, but I think the best results are obtained by using the C. P. acid; the crystals of pure Carbolic acid are needle-shaped and colourless, while the ordinary commercial acid comes in white flaky crystals. The Turpentine will also require some attention, for, as ordinarily sold, it is hardly suitable for this purpose.

Take one pint of Turpentine, and add to it about two ounces of 95% alcohol, shake thoroughly, and set aside until the liquids separate (the alcohol will be the upper liquid), remove the turpentine to another bottle (which should be quite clean), and add to it about one pint of distilled water, give another good shake, and set aside until separation takes place; the turpentine will now be on top; pour it off carefully, and add about one ounce of finely ground starch, and filter through paper; you will now have a pure and sparkling turpentine. The alcohol used need not be wasted, as it will do for cleaning slips, brushes, etc., also for burning.

After your insect has become clear in the carbolic acid and turpentine solution, remove it to a cell of proper depth, and drain off superfluous solution, arrange the wings, legs, and antennæ, add one or two drops of Canada balsam dissolved in turpentine, and apply the cover glass, remove any balsam that may have run over, and cement down the cover. If the directions given are carefully followed, you will have a mount that you can spend hours in examining, and one that will show better the internal organs, than can be done by following any other method of preparation with which I am acquainted. In this method of preparing insects, for microscopical examination, as in a great many other processes, the longest part of the process is the description.

BOOK NOTICES.

Canadian Spiders, by J. H. Emerton. Transactions of the Connecticut Academy, Vol. IX., July, 1894; 30 pp.; 4 plates.

This interesting and valuable paper treats of spiders collected in various parts of Canada, from the Rocky Mountains to the Gulf of St. Lawrence. The author states at the outset that the species differ little from those of the New England States. "Out of 61 species, from Labrador to Manitoba, 56 species live in New England; and 27 out of 48 species from the Rocky Mountains." Of the latter, no less than 40 of the species mentioned were collected by Mr. Bean at Laggan, and of these sixteen are described as new to science. Mr. Tyrrell, of the Geological Survey of Canada, supplied other species from the Rocky Mountain region, Alberta Territory, and Ottawa, and other collectors from the various localities mentioned in the paper. The plates illustrating the new species are admirably drawn by the author, the excellence of whose work in scientific illustration has long been well-known and highly appreciated.

Report of Observations of Injurious Insects and Common Farm Pests during the year 1894, with Methods of Prevention and Remedy. Eighteenth Report. By Eleanor A. Ormerod, F. R. Met. Soc., etc., etc., London: Simpkin, Marshall, Hamilton, Kent & Co., Limited. 1895, pp. 122, lxii., plate.

In this the author has given us another of her most excellent Annual Reports, if anything, better than those that have preceded it. There are 29 species, besides the two groups, Julidæ and Vespidæ, fully treated in the Report, which is illustrated by 45 figures and one excellent plate, the latter devoted to the Stem Eelworm, *Tylenchus devastatrix*, in connection with its recent discovery as injurious to hops. We congratulate the author on being able to give us so much information on Eelworms, Warble Fly, and Carabid enemies of the strawberry. In fact, she has, throughout her Report, strictly adhered to the plan expressed in the preface, viz.: "not to enter again on such of our common infestations as have been repeatedly noticed in my preceding Reports, excepting where there was some new information to be given or (sometimes) needed." This renders the Report of unusual value. To do the publication justice is simply out of the question in an ordinary book notice, but suffice it to say that it is in every way a credit to its author.

The writer well remembers an evening spent with the late Fraser S. Crawford, at his suburban home near Adelaide, South Australia. We had been discussing entomology and entomologists, when he made a remark something like this: "Miss Ormerod is a noble woman, and is giving both her life and her wealth to the agricultural interests of England, and I cannot understand why she should not be better appreciated by Englishmen." The sentiment will be echoed by American entomologists, but I fear in our hurry and bustle, we forget to drop an occasional word of encouragement and appreciation, such as we ourselves would gladly receive. Working almost alone, and comparatively unaided, in a labour of love not always appreciated, it seems to me that words of encouragement from her colleagues, both in America and out of it, are but matters of justice. Other reports on Economic Entomology there are, and they come officially from the Board of Agriculture of England, but the writer has searched through them in vain for tokens of originality or just credit for the information contained in them. F. M. W.

NOTES.

The Editor regrets to announce that the main building of Trinity College School, of which he has been Head Master for the last twenty-five years, was totally destroyed by fire on the night of Saturday, February 9th. Though the weather was intensely severe and all the boys were in bed when the fire broke out, no one was injured in any way. School-work was resumed in temporary quarters on the Tuesday morning, and in a few days a large hotel and other premises were secured, in which the boys are comfortably provided for until the work of rebuilding is completed.

The Editor desires to thank his many friends for their kind letters of sympathy, and begs that his correspondents will pardon any delay in reply to their letters, as his time is so fully occupied with other matters. Though he lost a large number of books and valuable papers, his entomological library and collections were fortunately in his private residence, which was with much difficulty saved from destruction.

We are sorry to learn that others have been less fortunate than ourselves during this disastrous winter. MR. C. H. TYLER TOWNSEND had his valuable library, which was particularly rich in works on European and American Diptera, stored in a warehouse at Las Cruces, New Mex. During his absence at Washington, the building was burned down and all his property was destroyed. He will be very grateful to any correspondents who will send him as complete sets as possible of their publications. His address is now Brownsville, Tex , where he is acting as temporary Field Agent of the Division of Entomology, U. S. Department of Agriculture. MR. J. G. JACK, of Jamaica Plain, Mass., has also sustained a very serious loss by the destruction by fire of his library and collection. We trust that those who are in a position to do so will assist in replacing them.

MR. A. R. GROTE, of Bremen, Germany, has changed his address to "39 Gartenstrasse, Hildesheim, Germany."

We grieve to record the deaths of DR. GEORGE MARX, the eminent Arachnologist, who expired at Washington, D.C., on the 4th of January, aged 56 years; and of MR. BERTHOLD NEUMOEGEN, a frequent contributor to this magazine, and the possessor of a very valuable and extensive collection of Lepidoptera, who died of consumption, in New York, on the 21st of January, in the 50th year of his age.

Mailed March 30th, 1895.

NEMEOPHILA PETROSA, WALK. AND VARIETIES.

The Canadian Entomologist.

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THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

IX. The Dytiscidæ (Colymbetini) of Ontario and Quebec.

The Colymbetini, which follow the Hydroporini in Dr. Leconte's scheme, are immediately distinguished therefrom by the distinctly five-jointed tarsi, and also, as a rule, by the much greater size. The males have the anterior, or middle tarsi, variously modified, but not forming regularly rounded disks as in the following group. Using the characters developed by the writers, whose works have already been mentioned, we may divide the Canadian genera thus :—

A. Semimembranous side pieces of first dorsal segment smooth.
  b. Hind tarsi with unequal claws.
    Black or metallic above..... ....*Ilybius.*
    Ferruginous above..... .....*Matus.*
  bb. Hind tarsi with claws equal or nearly so.
    c. Last joint of palpi emarginate.....*Coptotomus.*
    cc. Last joint of palpi normal.
      d. Elytra deeply 10-striate.....*Copelatus.*
      dd. Elytra not regularly striate.
        e. Prothorax not margined; elytra with numerous very short minute longitudinal striæ....*Agabetes.*
        ee. Prothorax margined at sides.
          Wing of metasternum linear, strongly curved.....*Ilybiosoma.*
          Wing of metasternum wedge-shaped.....*Agabus.*

AA. Semimembranous side pieces of first dorsal rugose. Species usually large.
  Elytra reticulate.....*Scutopterus.*
  Elytra smooth or with short coarse lines; metasternum with deep groove.....*Rhantus.*
  Elytra transversely strigose; metasternum with feeble groove.....*Colymbetes.*

The character mentioned above for the primary separation of the groups of genera, the sculpture of the first dorsal segment, may need some explanation. The rugosities referred to under group AA. are to be seen near the first spiracle, and to be appreciated the elytron must be raised. However, it will seldom be necessary to refer to this, if a little experience, or a few named specimens, are in the possession of the student, since the groups separate easily by their facies.

ILYBIUS, Er.

The following scheme gives, in tabular form, the difference between the Canadian species as defined by Dr. Sharp. Lacking two of them, I am unable to verify the characters :—

A. Hind tarsi of males with the joints margined at the external lower edge.
   b. Last ventral of ♂ not carinate, the apical portion with coarse longitudinal striæ (.46 in.).....*subæneus*, Er.
   bb. Last ventral of ♂ with distinct median apical carina.
      Outer claw of anterior tarsi emarginate near the base in the ♂; legs piceous (.45 in.).....*4-maculatus*, Aubé.
      Outer claw of anterior ♂ tarsi simple; legs rufous (.38 in.).....*angustior*, Gyll.

AA. Hind tarsi of ♂ not margined at the lower external edge; last ventral with rather short carina, hind margin obscurely rugose; anterior feet rufous, posterior piceous (.40 in.)..*biguttalus*, Germ.

The considerable longitudinal convexity of the species of Ilybius, with their finely reticulate sculpture, renders them easily distinguishable from the neighbouring genera. In colour all are black above, more or less metallic, the elytra with two small pale lateral spots, one of which is sub-apical. *I. viridiæneus*, Cr., does not appear in the above table, since Dr. Sharp has placed it in synonymy with *I. subæneus*, Er.

COPTOTOMUS, Say.

C. interrogatus, Fabr., represents this genus. It is of ovate, subconvex form, about .28 in. long, head red with black vertex, thorax reddish, black at base and apex. The elytra are brownish with pale irrorations, a short vitta near the scutellum, and the external margin irregularly yellow. The under side and legs are reddish.

ILYBIOSOMA, Crotch.

A black beetle about the length of the preceding is *I. bifarius*, Kirby. The thorax is short with rounded sides, rufescent in colour, and with broad margin. The elytra are covered with little striolæ, which, in

general, are longitudinal in direction, but behind the middle slope somewhat towards the suture. The front of the head and the legs are red.

COPELATUS, Er.

Here belongs *C. glyphicus*, Say, which is peculiar on account of the distinct elytral striæ. Colour rufo-piceous, legs paler. Length, .19 to .24 in.

MATUS, Aubé.

Elongate, brownish-red, thorax rounded at the sides, anterior angles acute. Length, .32 in. Easily recognized by the elongate form and peculiar colour. Our species is *M. bicarinatus*, Say.

AGABETES, Crotch.

Oblong-oval, black, beneath reddish. Thorax very short, sides rounded, lateral margin reddish; elytra with reddish humeri, the surface covered with minute short scratches. Length, .27 in. *A. acuductus*, Harr.

AGABUS, Leach.

The species of Agabus are very numerous, and, from their extreme similarity in some parts of the series, difficult to separate. While none of them are very large, most of them are above a quarter of an inch in length; the colour is usually blackish, often more or less metallic, rarely variegate. They may often be found under stones in wet grassy places, or around the roots of plants in marshes and shallow pools; the swimming legs are usually rather feebly developed.

It has been deemed unwise to attempt a synoptic table, several of the Canadian species not being at hand for study. We have, therefore, been content to follow in the main the arrangement of Mr. Crotch, with the addition of such species as have been described since the publication of his paper, and such changes of nomenclature as seem necessary to bring it into correspondence with recent researches. The groups are based on the form of the male claws, the females offering too few characters of value to enable them to be identified in many cases without the corresponding males. This latter sex has the anterior tarsi more or less swollen, the joints beneath being clothed with hairs usually tipped with minute disks.

Group I. Anterior external claw in the ♂ very elongate, broadly dilated, internal one elongate and sinuate.

A. erythropterus, Say. Oval, convex, black, opaque; legs, margins of ventral segments and elytra yellowish brown, the sides and humeral angles paler. Surface of elytra closely reticulate, dorsal punctures obsolete. .37 in.

Group II. Anterior external claw acutely dentate in the ♂.

Fig. 9.

A. disintegratus, Cr. (Fig. 9). Reddish, thorax blackish before and behind, elytra with narrow blackish vittæ, metasternum black. .30 in. Easily recognized by its colour.

A. tæniolatus, Harr. Resembles the preceding, but is a little larger and broader, the metasternum not black, the first joint of the middle tarsi in the ♂ considerably exceeding the larger of the tibial spurs in length.

A. stridulator, Sharp. Oblong-oval, black, polished, not reticulate above; antennæ and feet rufous, femora picescent .24 in.

A. semivittatus, Lec. Rather broadly ovate, black, shining, sides of thorax nearly straight, elytra finely and obsoletely punctulate, dorsal series of punctures rather deeply impressed, irregular, confused towards the apex. A submarginal yellow vitta is found in the apical third, the hind tibiæ are punctate at base. .35 in.

A. semipunctatus, Kirby. Ovate, convex, shining, black, sides of body rather parallel. Elytra very finely reticulate, dorsal series of punctures well marked, additional ones in the intervals. Hind tibiæ smooth. .24 in.

Group III. Anterior claws elongate, sinuate, compressed, or obtusely dentate in the males.

A. Erichsoni, Har. Oblong-oval, very convex, black, ænescent above, elytra obscurely ferruginous at the sides, densely and conspicuously reticulate. Antennæ rufous, feet piceous. Posterior angles of thorax obtuse. .40 in.

A. seriatus, Say. Ovate, sub-convex, black, above bronzed, legs rufescent. Elytra with fine reticulations, shining, hind angles of thorax rectangular. .40 in.

A. parallelus, Lec. Much like *seriatus*, but is said to differ in the more elongate parallel form and black legs. .42 in.

A. infuscatus, Aubé. Ovate, brassy-black, mouth, legs, sides of thorax, margins of elytra and ventral segments yellowish-brown, the femora infuscate. Thorax with the surface coarsely rugulose and reticulate, elytra very finely reticulate. .30 in.

A. anthracinus, Mann. Ovate, convex, black, slightly bronzed

above, antennæ, legs and humeral region of elytra pitchy-red, anterior thoracic angles rufescent. Elytra rather coarsely reticulate with unequal areolæ, dorsal series of punctures obsolete. .30 in.

A. subfuscatus, Sharp. Oval, highly polished, black, prothorax somewhat ænescent, elytra fuscous, base and sides vaguely testaceous, antennæ and feet rufo-testaceous. Elytra sparsely finely punctulate, not reticulate. .30 in.

A. confinis, Gyll. Oblong-oval, polished, nearly smooth, black, elytra blackish, with rufescent sides, antennæ and feet rufous, the femora more or less piceous. Elytra hardly visibly punctulate, the dorsal series irregular. .38 in.

Group IV. Anterior claws of males simple.

A. obtusatus, Say. Ovate, rather convex, black, shining, sides of thorax rounded, more so in the ♂. Elytra with distinct dorsal series confused behind, areolæ rather large; subapical and sublateral vittæ yellow. .30–.32 in.

A. stagninus, Say. Broadly ovate, less convex, black, slightly bronzed, shining, legs paler. Sides of thorax little rounded, strongly margined. Elytra very finely reticulate, with submarginal yellow vitta on apical half. .40 in.

A. punctulatus, Aubé. Black, shining, regularly ovate, antennæ, legs and elytra ferruginous, disk darker. Thorax brassy, sides rufescent, finely margined and nearly straight, the surface irregularly reticulate; elytra finely punctulate, hardly visibly alutaceous, dorsal series rather obsolete, but not irregular. .25 in.

A. reticulatus, Kirby. Ovate, black, legs ferruginous, elytra griseous, with margins and epipleuræ yellowish; thorax fulvous, anterior and posterior margins black, head rufous in front. Elytra with irregular areolæ, giving a somewhat scabrous effect. .30 in.

A. gagates, Aubé. Ovate, convex, shining, piceo-rufous, bronzed above. Head in front and anterior angles of thorax red, sides of thorax slightly rounded, rather strongly margined; elytra finely and closely reticulate, appearing punctulate towards the apex, dorsal series well marked. .38 in.

A. tristis, Aubé. Elongate-oval, rather narrowed behind, tolerably shining, pitchy-black; thorax with anterior angles broadly fulvous, sides slightly rounded, rather strongly margined and sinuate. Elytra rather evidently coarsely reticulate, areolæ small, dorsal series tolerably distinct

with numerous punctures. .40 in. A variety occurs in California in which the thorax is entirely black.

SCUTOPTERUS, Esch.

Two species are recorded from Canada, neither of which are known to us in nature. They are, according to Dr. Sharp, different in shape from the other Colymbetini proper, and remind us somewhat of large *Agabi*. The surface sculpture consists of fine reticulations, resembling that of *A. tristis*. They are thus separated, the measurements being those of Dr. Sharp :—

Shining black, serial punctures distinct behind. .64 in. ..... *Hornii*, Cr.
Less shining, piceous black, serial punctures indistinct behind.
.64 in. ..... *angustus*, Lec.

RHANTUS, Esch.

The species of this genus are often yellowish above, with black irrorations on the elytra, and often darker spots on the head and thorax. They are a little less than half an inch in length, and may be separated on the following characters :—

A. Base of prothorax profoundly bisinuate, the hind angles prolonged, acute, black ; legs, antennæ, sides of thorax and elytral epipleuræ rufo-piceous. .40 in. ..... *sinuatus*, Lec.

AA. Posterior angles of thorax not prolonged.

b. Body beneath mainly black, more or less variegate with fulvous. Thorax with two median black spots, head black, front fulvous, elytra and legs fulvous, the former thickly irrorated with black (.47 in.) ..... *binotatus*, Harr.
Thorax yellow, front and hind margins black ; head black, front and vertex fulvous, prosternum and four anterior legs pale (.40 in.) ..... *bistriatus*, Bergstr.

bb. Body beneath pale (.41 in.) ..... *tostus*, Lec.

COLYMBETES, Clairv.

Fig. 10.

Rather large, elongate beetles, with transversely striate elytra.

A. Legs black.

Elytra with sides and basal margin pale. Sides of thorax fulvous (.64–.70 in.) ..... *longulus*, Lec.
Elytra with basal margins and humeral angles pale, thorax fulvous, with transverse black median bar. (.74 in.) *seminiger*, Lec.

AA. Legs pale (.63 in.), (Fig. 10). *sculptilis*, Harr.

LIST OF BUTTERFLIES TAKEN AT WINNIPEG, MAN., 1894.

BY A. W. HANHAM.

Danais archippus, Fabr., June 2nd to 17th, July 8th to August 8th.
Argynnis cybele, Fabr., July 7th to August 8th.
" *myrina*, Cram. Rare. Single specimens taken on July 14th and August 4th and 8th.
" *bellona*, Fabr., May 24th to June 2nd, July 15th to August 8th.
Phyciodes nycteis, Db.-Hew. Rare. June 17th to 24th.
" *tharos*, Dru., June 10th to August 14th.
Grapta interrogationis, Fabr. Both forms bred, July 15th to July 22nd, from full grown larvæ off wild hop vine in my garden.
fabricii, Edw.
umbrosa, Lint.
" *comma*, Harr., July 7th and 23rd, August 7th.
" *progne*, Cram., June 6th, July 14th, and August 2nd.
" *j-album*, Bd.-Lec. Rare. April 26th and August 14th.
Vanessa antiopa, Linn., April 28th, July 8th to August 19th.
" *milberti*, Gdt., April 21st, August.
Pyrameis atalanta, Linn., July 8th to August 19th.
" *huntera*, Fabr., July 14th to August 19th.
" *cardui*, Linn, July 26th and August 5th.
(None of these species of *Pyrameis* were abundant.)
Limenitis arthemis, Dru., middle to end of June.
" *disippus*, Gdt., end of June and early in August.
Debis portlandia, Fabr., June 17th to July 22nd.
Neonympha canthus, Bd.-Lec., July 14th (one specimen).
Cœnonympha inornata, Edw., June 17th to 24th.
Satyrus nephele, Kirby. Plentiful. July 8th to August 18th.
Thecla, sp. Several examples seen May 20th.
" *calanus*, Hbn., July 15th (one specimen).
" *strigosa*, Harr. (form *Liparops*, Bdv.) Rare. July 8th and 15th.
" *acadica*, Edw., July 14th and August 8th. (Single examples.)
Chrysophanus thoe, Bd.-Lec. Rare. July 12th to 22nd.
" *helloides*, Bdv., June 10th to 24th, July 22nd to August 3rd. The commonest butterfly here this season; especially abundant within the city limits.
Lycæna sæpiolus, Bdv. Local. A stronger flyer than other Blues occurring here. June 17th to 24th.
" *afra*, Edw. Plentiful. May 24th to end of June.

Lycæna melissa, Edw. Rare. August 3rd to 8th. (No ♀ seen.)
" *pseudargiolus*, Bd.-Lec.
lucia, Kirby, May 20th to June 3rd.
violacea, Edw. } June 2nd to June 17th.
neglecta, Edw. }
" *amyntula*, Bdv. Abundant. May 24th to June 21st.

Pieris oleracea, Harr. Rare. June 3rd.
" *rapæ*, Linn., May 11th to September 3rd.

Colias eurytheme, Bdv., June 21st to 24th, July 14th to August 14th.
" *philodice*, Gdt., May 27th, July 8th to September 3rd.
" *interior*, Scud. One specimen taken by Mr. Lewis towards the end of June.
A white *Colias* seen and chased on June 24th.

Papilio turnus, Linn., June 2nd to 17th.
" *asterias*, Fabr. Examples taken July 15th and August 9th.
What appeared to be a black *Papilio* was seen on the wing in town on May 20th.

Ancyloxypha numitor, Fabr., June 24th. (One.)

Thymelicus garita, Reak., June 17th and 24th. Single examples.

Pamphila hobomok, Harr., June 2nd to 21st.
" *manitoba*, Scud. Local. August 3rd to 19th. (No ♀ captured.)
" *peckius*, Kirby. Middle of July to August.
" *mystic*, Scud., June 21st to end of month.
" *cernes*, Bd.-Lec., July 15th to August 4th.
" *metacomet*, Harr. Rare. Middle of July.

Amblyscirtes samoset, Scud., June 16th (one). On June 3rd an *Amblyscirtes* was missed; it may, however, have been this species.

Pyrgus tessellata, Scud. Mr. Lewis gave me a specimen of this insect taken early in July.

Nisoniades brizo, Bd.-Lec., May 25th to June 10th.
" *icelus*, Lint., June 2nd and 6th.
" *lucilius*, Lint., a worn specimen on August 14th.
" *juvenalis*, Fabr., May 25th to June 10th.

Eudamus pylades, Scud., May 25th to June 10th.
" *tityrus*, Fabr. Rare. July 8th (one).

A number of these species were new to me, and were kindly identified by Mr. James Fletcher, of Ottawa, to whom my thanks are due.

NEW TACHINIDÆ WITH A SLENDER PROBOSCIS.

BY D. W. COQUILLETT, WASHINGTON, D. C.

The Tachinidæ described below have a slender, rigid proboscis, of which the portion beyond the basal articulation is at least one-half longer than the height of the head. All are from the Pacific Coast, and, except where otherwise stated, were captured or bred by the writer.

Siphona plusiæ, n. sp.—♂ ♀ Terminal section of proboscis—the part beyond the second geniculation—not more than three-fourths as long as height of head. Frontal vitta yellow, less than twice as wide as either side of the front next the antennæ ; sides of front grayish pollinose, frontal bristles descending nearly to apex of second antennal joint, two pairs of orbital bristles; face whitish, the sides bare ; vibrissæ inserted near the oral margin, only two or three small bristles above each ; cheeks less than one-fourth as wide as height of eyes. Antennæ black, four-fifths as long as the face, the third joint three times as long as the second, two and one-half times as long as wide ; arista thickened on the basal half, the penultimate joint twice as long as wide. Proboscis brown, palpi yellow. Thorax and scutellum black, gray, pollinose, the former bearing three post-sutural macrochaetæ, the scutellum with a small, cruciate apical and three long lateral pairs. Abdomen black, the sides of the first segment broadly, and sometimes also of the second, except the hind corners, yellow ; gray pollinose, more or less of the hind margins of the segments shining ; a marginal pair and a single lateral macrochaeta on the second segment, a marginal row of six on the third and of four on the fourth. Legs yellow, the tarsi and usually the front femora and apices of the others, blackish ; claws and pulvilli very small. Wings hyaline, third vein bristly at least half way to the small cross-vein, the others bare ; hind cross-vein straight, perpendicular ; calypteres white. Length, 3 to 4.5 mm. Southern California. Thirty-one specimens. Of these, sixteen were bred from larvæ of *Plusia californica*, April 26th, 1883, and July 2nd, 1892 ; four others were bred from an unknown Noctuid larva July 31st, 1890 ; the remainder were captured in February and March.

Isoglossa, n. gen.—Proboscis slender, rigid, the portion beyond the basal articulation nearly twice as long as height of head, labella not differentiated ; palpi clavate, well developed. Eyes thinly pilose. Head not inflated, nearly quadrangular, broader than the thorax ; face slightly receding, lower margin of head straight, slightly longer than length of head at base of antennæ, anterior pair of ocellar bristles directed obliquely

outward, frontal bristles in a single row, three beneath base of antennæ. Facial ridges strongly diverging from their upper nearly to their lower ends, then strongly converging, but their lower ends widely separated, the ridges bristly on slightly more than the lower half; sides of face bare, each one-fifth as wide as the central fovea, the latter destitute of a median carina; vibrissæ rather short, inserted near the oral margin. Antennæ inserted considerably above the middle of the eyes, nearly as long as the face, the third joint five times as long as the second, rounded at the tip; arista bare, not longer than the third antennal joint, thickened on the basal four-fifths, the penultimate joint nearly one-half as long as the last one. Cheeks over one-third as wide as height of eyes, wholly pilose. Scutellum bearing a small, cruciate, apical pair of macrochaetæ and two long lateral pairs. Abdomen elongate-oval, slightly narrower than the thorax, the four segments subequal in length, destitute of a ventral process; macrochaetæ discal and marginal. Hind tibiæ not ciliate, claws and pulvilli nearly as long as the last tarsal joint. Apical cell open, ending the length of the small cross-vein before the tip of the wing, hind cross-vein slightly oblique, near the last third of the distance between the small cross-vein and the bend, the latter obtuse-angular, destitute of an appendix; third vein bearing two or three bristles at the base, the others bare; penultimate section of fifth vein nearly five times as long as the last section. (Name from the Greek: *isos* equal and *glossa* tongue.) Type, the following species.

Isoglossa hastata, n. sp.—♂ Frontal vitta brown, gray pollinose, subequal in width to either side of the front next the antennæ; front and face light gray pollinose, a blackish spot each side between them; antennæ, arista and proboscis black, the palpi yellow. Thorax and scutellum black, gray pollinose, the former with four black vittæ and three post-sutural macrochaetæ. Abdomen black, opaque gray pollinose, the sides of the last three segments broadly orange-yellow, the two spots meeting on the hind end of the last segment; genitalia black, protruding one-fifth the length of the last segment beyond the latter. Legs black. Wings hyaline, calypteres white. Length, 6 mm. Southern California. A single specimen in April.

Drepanoglossa occidentalis, n. sp.—♀ Arista thickened on the basal fourth, proboscis beyond the basal articulation one-half longer than height of head. Frontal vitta brownish-yellow, three-fourths as wide as either side of front next the antennæ, sides of front and face whitish pollinose;

frontal bristles descending nearly to tip of second joint of antennæ, two pairs of orbital bristles; sides of face bare; vibrissæ inserted some distance above the oral margin, only two or three small bristles above each; cheeks over one-third as wide as height of eyes. Antennæ four-fifths as long as the face, yellow, the third joint black, two and one-half times as long as the second, nearly four times as long as broad; penultimate joint of arista not longer than broad. Proboscis and palpi yellow, labella black. Thorax black, grayish pollinose, marked with four black vittæ, the outer ones broadly interrupted; three post-sutural macrochaetæ. Scutellum yellowish, bearing a small apical and two long lateral pairs of macrochaetæ. Abdomen yellow, a black dorsal vitta on the last three segments, most expanded on the third; a marginal pair and a single lateral macrochaeta on the second segment, and a marginal row of six on each of the two following. Legs, including the coxæ, yellow, the tarsi black; claws and pulvilli less than one-half as long as the last tarsal joint. Wings hyaline, no costal spine, third vein bearing two bristles at the base, the others bare; apical cell open slightly before the tip of the wing, hind cross-vein sinuate and very oblique, at last third of distance between the small cross-vein and the bend, the latter arcuate; calypteres whitish. Length, 8 mm. Southern California. A single specimen in July.

Drepanoglossa venatoris, n. sp.— ♀ Differs from the above description of *occidentalis* only as follows: Frontal vitta scarcely more than one-half as wide as either side of the front, cheeks over one-half as wide as height of eyes. Third joint of antennæ twice as long as the second, only twice as long as wide. Proboscis black. Scutellum, bearing an additional lateral pair of macrochaetæ. Abdomen black on last two segments, yellowish-gray pollinose, third segment with a marginal row of ten, the fourth with a discal row of ten and a marginal row of eight macrochaetæ. Claws and pulvilli nearly as long as the last tarsal joint. Third vein bristly half way to the small cross-vein, costal spine distinct, fourth vein obtuse-angular at the bend, hind cross-vein straight. Length, 9 mm. Washington. A single specimen from Prof. O. B. Johnson.

Siphophyto setiger, n. sp.— ♂ Second segment of abdomen bearing a marginal pair of macrochaetæ. Frontal vitta yellowish-brown, subequal in width to either side of front next the antennæ, sides of front grayish pollinose, frontal bristles descending to base of third antennal joint, two pairs of orbital bristles; face whitish pollinose, the sides bare; vibrissæ inserted near the oral margin, only two or three small bristles above each;

cheeks over one-third as wide as height of eyes. Antennæ black, five-sixths as long as the face, the third joint five times as long as the second, five times as long as broad; arista thickened on the basal three-fourths, the penultimate joint over twice as long as broad. Proboscis black, the part beyond the basal articulation one-half longer than height of head, slender, the labella scarcely thicker; palpi yellow. Thorax and scutellum black, grayish pollinose, the former bearing three post-sutural macrochaetæ, scutellum with two long pairs. Abdomen black, subshining, base of each segment excepting the first narrowly gray pollinose; second segment with a marginal pair and a single lateral macrochaeta, the following each with a marginal row of six. Legs black, claws and pulvilli very small. Wings hyaline, base of third vein bristly, the others bare; apical cell closed slightly before the margin near the tip of the wing, hind cross-vein straight, perpendicular, slightly nearer to the small cross-vein than to the bend, the latter arcuate; calypteres whitish. Length, 4 mm. Southern California. A single specimen in February.

Siphophyto opacus, n. sp.—♀ Differs from the above description of *setiger* only as follows: Second segment of abdomen destitute of a marginal pair of macrochaetæ. Third joint of antennæ four times as long as broad, penultimate joint of arista only one-half longer than broad. Abdomen, except the first segment, wholly opaque gray pollinose, first and second segments each with a lateral macrochaeta, the third with a marginal row of six, the fourth with a similar row of eight. Length, 5 mm. Southern California. A single specimen in April.

NOTES ON THE THYATIRIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

In describing the larval characters of this family (Proceedings of the Boston Society of Natural History, 1894, p. 399), I followed the arrangement of generic terms in Smith's list; but I believe that it can be improved. So I would arrange the genera of this neat little family as follows (following Hampson):—

Fore wing with a tuft of scales at internal angle.

Fore wing not elongated; outer margin rounded..... *Habrosyne.*

Fore wing elongated; outer margin subangulate..... *Pseudothyatira.*

Fore wing without this tuft.

Fore wing with vein 6 arising from angle of cell or below.

Accessory cell reaching less than half way to apex..... *Thyatira.*

Veins 7 to 9 long-stalked (accessory cell long)..... *Euthyatira.*

Fore wing with vein 6 stalked; colour gray..... *Bombycia.*

Genus *Habrosyne*, Hübner.

H. scripta, Gosse.

Our single species is closely allied to the European *H. derasa*. Dr. Ottolengui has distinguished a climatic variety in his collection, which is of interest. The larva is known.

Genus *Pseudothyatira*, Grote.

Closely related to the preceding. The larva of one form is known. and closely resembles that of *Habrosyne*. As I have not seen the proof that the two forms classed here are but varieties, I would prefer to give them specific rank. I have seen no intergrades.

P. cymatophoroides, Grote.

P. expultrix, Grote.

Genus *Euthyatira*, Smith.

The larva of the only known species is widely different from that of the European *Thyatira batis*. Our larva is a concealed feeder, and without markings, while the European one possesses the structure of *Habrosyne*, but still further developed.

E. lorata, Grote.

E. pudens, Guenée.

E. semicircularis, Grote.

The structure of the veins excludes this last species from *Bombycia;* its markings do not differ essentially from those of *Euthyatira*, though the outer white patches are all lost, and the wings are rather broad.

Genus *Bombycia*, Hübner.

Mr. Hampson, in his Moths of India, refers *Bombycia* to the *Noctuidæ*, but this is the *Bombycia* of Stephens, not of Hübner (type *B. viminalis*, Fab.). According to Mr. Grote, the type of *Bombycia*, Hübn., is *B. or*, of Europe. We have two species, or possibly varieties, congeneric with this type.

B. improvisa, Hy. Edw.

B. tearlei, Hy. Edw.

The larvæ are unknown.

The two species numbered 1,467 and 1,469, in Smith's list, have been already removed from the family. Concerning No. 1,467, *magnifica*, Streck., Mr. Grote writes in the Entomologist's Record and Journal of Variation (Vol. VI., p. 80) :—"Examined by me in 1882, and determined then to be a Cossid." The reference of this species to Cossula by the late Mr. Neumoegen and myself was quite independent of Mr. Grote's observation, and it is interesting to have his positive determination thus corroborate ours, made solely from the description.

Bombycia candida, Smith, will require further examination before it can be accurately placed among the Thyatiridæ.

PRELIMINARY STUDIES IN SIPHONAPTERA.—IV.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (Division II. continued.)*

TABLE OF SPECIES OF GROUP 2.

A. Abdominal segments each with three dorsal rows of bristles; whole insect very heavily spined and bristled; antennal groove in middle of head; bristles on joint 2 of antennæ longer than joint 3; maxillary palpi in female with joint 2 four-fifths of 4, and 3 two-thirds of 4; labial palpi reaching to one-third of anterior femora; pronotal comb of 20 spines; in anterior tarsi joint 3 two-thirds of 2 and shorter than 1, 5 twice 4 and less than 1 and 2 together; in middle tarsi joint 2 slightly shorter than 1 and longer than 5, 5 twice 4, and 1 long as 3 and 4 together; in posterior tarsi joint 1 long as 2 and 3 together, 5 one-half of 1 and much longer than 3, 2 about as long as 3 and 4 together, and less than 4 and 5 together; hind femora with a row of bristles on the side; leg spines long, apical spines on second joint of hind tarsi longer than joints 3 and 4 together; colour, light brown; length, 2–3 mm. . . *hirsutus*, n. sp.

AA. Abdominal segments each with one dorsal row of bristles; antennal groove in middle of head; maxillary palpi in female with joint 3 three-fourths of 4; labial palpi reaching to one-third of anterior femora; spines on legs medium; apical spines on joint 2 of hind tarsi longer than joints 3 and 4 together; in middle tarsi joint 5 longer than twice 4, 1 shorter than 3 and 4 together; hind femora with a row of bristles on side . . . . . *D.*

AAA. Abdominal segments each with two dorsal rows of bristles; in middle tarsi joint 1 equals 2; bristles on joint 2 of antennæ long as joint 3; spines on legs medium. . . . . *B.*

B. Apical spines on joint 2 of hind tarsi long as joints 3 and 4 together; antennal groove in middle of head; maxillary palpi in female with joint 2 three-fourths of 4, and 3 two-thirds of 4;

**P. pencilliger*, Grube, and *P. metallescens*, Kol., should have been mentioned as belonging to this division. The very insufficient descriptions render their location impossible. The former was described from various *Mustelidæ*, and the latter from *Xantharpyia ægyptiaca*. *P. echidnæ*, Denny, described from *Echidna hystrix* (Van Diemen's Land), should likewise have been mentioned in connection with Division I. These names doubtless represent good species, and it is to be hoped that collectors living within the range of these animals will take pains to obtain good series of the fleas infesting them.

labial palpi reaching to one-third of anterior femora; pronotal comb of 16 spines; in anterior tarsi joint 2 longer than 1 and one-third longer than 3; in middle tarsi joint 1 equals 3 and 4 together and shorter than 5, while 5 is twice 4; in posterior tarsi joint 1 equals 2 and 3 together, 5 a little longer than 3 and less than one-half of 1, while 2 is three times 4 and less than 4 and 5 together; hind femora with a row of bristles on side; colour, light reddish-brown, darker dorsally on abdomen; length, 2–2.5 mm..... *Bruneri*, n. sp.

BB. Apical spine on joint 2 of hind tarsi shorter than joint 3; pronotal comb of 18 spines; in anterior tarsi joint 1 little, if any, longer than 3..... *C.*

C. Antennal groove in anterior half of head; maxillary palpi in female with joint 2 little shorter than 4, 3 two-thirds of 4; labial palpi reaching to end of anterior trochanters; in anterior tarsi joint 5 shorter than 1 and 2 together, 1 and 2 nearly equal; in middle tarsi joint 5 equals twice 4, and about the same as 2, while 1 about equals 3 and 4 together; in posterior tarsi joint 5 shorter than 3 and 4 together, and one-half of 1, 2 is three times 4 and long as 4 and 5 together; colour, light brown, darker dorsally on abdomen; length, 2.5-3 mm. *sciurorum*.

CC. Antennal groove in posterior half of head; labial palpi reaching to one-third anterior femora; in anterior tarsi joint 2 long as 3 and 4 together, 1 twice 4; in middle tarsi joint 5 equals 3 and 4 together; in posterior tarsi joint 1 twice 2, 5 shorter than 1 and long as 3 and 4 together; colour, light reddish brown; length, 5 mm..... *melis.*

D. Apical spine on joint 1 of hind tarsi only half as long as joint 2; maxillary palpi in female with joint 2 longer than 4; bristles on joint 2 of antennæ shorter than joint 3; pronotal comb of 12 spines; in anterior tarsi joint 2 longer than 3 and about equal to 1, 5 twice 4 and shorter than 1 and 2 together; in middle tarsi joint 5 one-fourth longer than 2; in posterior tarsi joint 5 long as 3 and 4 together, and one-half of 1, 2 three times 4 and more than 4 and 5 together; colour, light brown; length, 2 mm..... *longispinus*, n. sp.

DD. Apical spine on joint 1 of hind tarsi nearly as long as joint 2; maxillary palpi in female with joint 2 shorter than 4; bristles

on joint 2 of antennæ longer than joint 3; pronotal comb of 16 spines; in anterior tarsi joint 1 equals 3 and is shorter than 2, 5 long as 1 and 2 together, and nearly three times 4; in middle tarsi joint 5 one-fifth longer than 2; in hind tarsi joint 5 less than 3 and 4 together, but more than one-half of 1, 2 twice 4, but less than 4 and 5 together; colour, light brown, darker dorsally on abdomen; length, 2.25–2.5 mm... *montanus*, n. sp.

Pulex hirsutus, n. sp.

This flea, with its long and abundant spines and bristles, presents a very unusual appearance. It was collected on the Prairie Dog (*Cynomys ludovicianus*), at Stove Prairie, Larimer Co., Colo., by Prof. C. P. Gillette.

Pulex Bruneri, n. sp.

I have received specimens of this species taken on *Spermophilus 13-lineatus* and *S. Franklini*, at Lincoln, Neb., by Prof. Lawrence Bruner, and others, taken on the first named host by Prof. Herbert Osborn. I have also taken specimens from the same host at Fort Collins.

Pulex sciurorum, Bouche.

1835. Bouche, Nov. Act. Acad. Leop., Carol., XVII., 1., p. 506.

I have specimens of this species from Dr. Taschenberg, taken on *Sciurus vulgaris* in Germany. It has also been recorded from *Rhinolophus ferrum-equinum*. I do not know that it occurs in North America.

Pulex melis, Walker.

1856. Walker, Insecta Britt. Diptera, III., p. 5.

This very large and long flea has been recorded from *Meles taxus* and *Canis vulpes*. I have seen no fleas from either badger or fox collected in North America.

Pulex longispinus, n. sp.

I have received specimens of this flea taken on Fremont's Chickaree at Georgetown, Colo., with *P. coloradensis*. It seems likely that there is an error in the data for either this species or *P. coloradensis*. It is not a usual occurrence for two species of fleas to be found living together on a single wild animal. These species are totally distinct.

Pulex montanus, n. sp.

My specimens of this flea were taken from the large Mountain Grey-Squirrel (*Sciurus Aberti?*), in the foothills west of Fort Collins, by Prof. J. D. Stannard.

[TO BE CONTINUED.]

OBITUARY.

The following particulars respecting our late correspondent have only recently been obtained :—

Oliver Jacob Staley, of Marshall, Saline Co., Mo., died July 6th, 1894 while on a collecting trip near home. His body was found by searching parties, in a creek, face downward. A sultry day induced him to bathe with fatal result. He was born in Princetown, Schenectady Co., N. Y., and removed with his parents to Marshall, Mo., thirteen years ago. He practiced law for about four years, and was in the twenty-fifth year of his age. A member of the Y. M. C. A., he was much respected by everybody. He published in the CANADIAN ENTOMOLOGIST, Vol. XXIV., p. 201, "A List of Butterflies found at Marshall, Missouri, and vicinity." During the last six years he had been actively collecting Lepidoptera.

R. E. KUNZE.

NOTE ON THE PLATYPTERYGIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the Proceedings of the American Philosophical Society for 1874 is published a list of certain family groups of Bombycine moths, and I retained there the term *Platypterices*, of Hubner, 1806, for the group to which now a distinct family value is given, and which should therefore bear the name *Platypterygidæ*. Already in 1868, Trans. Am. Ent. Soc., I had proposed the subfamily termination to the corrected original term of Stephens: *Platypterícidæ*. The question as to which of the two terms should be employed, *Drepanidæ* or *Platypterygidæ*, should, I think, be decided in favour of the latter form of the plural use of the name by Hubner and Stephens. Schrank's original genus *Drepana* is the first generic term used in the group. The genus is a mixed one. It contains: 1, *D. sicula;* 2, *D. falcula;* 3, *D. flexula* (not belonging here); 4, *D. hamula;* 5, *D. lacertula;* 6, *D. spinula*. Schrank's definition is "Sichelspinner." Laspeyres's restriction (1803) of the group under the name *Platypteryx* is the first to be made, and Hubner, in 1806, still further restricts Laspeyres's name to the single type *P. hamula*. To this structural type should the name *Platypteryx* be henceforth confined, and with this type our North American species, *arcuata*, *genicula* and *siculifer* appear to agree. From the description I have shown there is a probability that Stephens's *Drepana fasciata* was based upon one of our *Geometridæ* belonging to *Drepanodes*. So far, then, as our fauna is concerned, the

exact type of *Drepana* (one of the above six species of Schrank's) is not now in question. In 1868 I did not know the use of Laspeyres's term by Hubner in 1806, and following Stephens, incorrectly used *Drepana* for our species; but I changed this use in the paper above cited in 1874, reverting to the name *Platypteryx* used by me in my first paper on our species, Proc. Acad. Nat. Sci., Phil., 1862, p. 59.

ADDITIONS TO THE LIST OF U. S. HYMENOPTERA.

BY T. D. A. COCKERELL, NEW MEXICO AGR. EXP. STA.

(1.) *Smicra divisa*, Walker.—On July 8th, 1892, Prof. C. H. T. Townsend collected some specimens of a *Smicra* in the Grand Canon, Arizona; and on July 27th he obtained what is doubtless a ♂ of the same species, at the Zuni River, Arizona. These had remained in our collection unnamed, until Miss MacGilmore, a student in zoology, worked them over, and concluded they were probably Walker's *divisa*. I hardly agreed with this, rather thinking the insect was new, but Mr. Ashmead has now seen a specimen, and declares it is really *divisa*. The type locality of *S. divisa* is Orizaba, Mexico, and no other specimens than Walker's were known to Mr. Cameron when writing the Chalcididæ of Biol. Cent. Am. The Grand Canon specimens differ from Walker's short description in the scutellum having two yellow spots, not a yellow hind border. The teeth on the hind femora deserve some comment. Walker says: "One large and several small teeth." Cameron places the species in his section B.: "Femoral teeth small, minute, more than eight in number." Our insect has one large and six small teeth, and so could not be *divisa* if Cameron were correct; but the little that Walker says accords with our species, and would place it in Cameron's section A.

(2.) *Philanthus multimaculatus*, Cameron.—One on *Chilopsis* in Mr. Barker's garden, at Las Cruces, N. M., June 5th, 1894 A pretty and distinct species, easily recognized by Cameron's figure and description in the Biol. Cent. Amer. The type locality is Atoyac, in Vera Cruz, Mexico.

(3.) *Crabro centralis*, Cameron.—On *Solanum elæagnifolium* in open ground behind the Central Hotel, in Las Cruces, N. M., June 10th, 1894 (Ckll., 887). This was identified for me by Mr. Fox, and will be included in his forthcoming memoir on N. A. Crabronidæ. I mention it now only to call attention to the curious fact that it also originally came from Atoyac, in Vera Cruz, being, however, also found in Guatemala and Panama.

A NEW PULVINARIA FOUND ON ORCHIDS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Pulvinaria brassiæ, n. sp.

♀ scale rather like *Lecanium hesperidum*, elongate-oval, flattish, pale olive-brown, 2½ mm. long. Ovisac white, firm, elongate, parallel-sided, distinctly longitudinally grooved, 8 mm. long, 2 broad. Derm colourless, not tessellate. Margin with a double row of easily-deciduous, strong, usually large, blunt spines, which are, near the lateral and posterior clefts, more or less branched at their tips. Spines of lateral clefts in threes, one very long and large, two very short and small. Anal plates brown, longer than broad, their outer sides meeting at about a right angle. Each plate with three small spines at tip, and three large bristles on outer hind margin. Anogenital ring with six stout hairs. Rostral loop reaching to level of insertion of middle pair of legs. Antennæ 8-jointed; 3 longest, but not greatly so. Formula 32 (458) 167. Two and 5 each with a long hair; 8 with several long hairs. Legs ordinary; coxa more than half as long as trochanter + femur. Trochanter with a strong, but not *very* long, bristle. Claw short, stout, curved. Tarsal digitules long, moderately stout, distinctly knobbed. Digitules of claw extremely stout, gradually widening to the large knobs.

Hab.—On leaves of *Brassia verrucosa*, a native of Mexico, in greenhouse at Ottawa, Dec. 15th, 1894 (J. Fletcher). The actual plant was purchased from a New Jersey florist, and the insect has been found on no other in the house. It is quite a distinct and peculiar form of the type of *P. camelliæ*, but smaller, with a much narrower, ribbed ovisac. I regret that I have not seen the description of *P. linearis*, Targ., 1885, found on *Camellia japonica*, but it is doubtless safe to assume that it cannot be that species.

THE USE OF MEGALOPYGE.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the able and original paper on "Evolution and Taxonomy," by my friend, Prof. Comstock, published in 1893, is a note, on page 103, relating to the use of the generic title *Megalopyge*. The author says, referring to Berg's (not "Berge") articles on Argentine Lepidoptera: "This monograph seems to have been overlooked by American writers." This seems not quite correct. In Papilio, Vol. 3, 106–8, I have published (1883) a review of these papers by C. Berg. I took, in the course of a lengthy

review, the ground that Hubner's genus *Megalopyge* was a mixed genus, being proposed for two species, *lanata* and *nuda*, and that there was no proof that these two species were congeneric. In the absence of such proof, it was not correct for Berg to designate *lanata* (and its structural allies) as either the type of or typical of *Megalopyge*. Under these circumstances, I preferred Harris's term *Lagoa* as a proper restriction of Hubner's genus for the type to which *pyxidifera*, *opercularis* and *crispata* belong. I did not know then, what seems to be the fact, that *Lagoa* was preoccupied and must be wholly rejected on this score. But then *Pimela*, Clem., 1860, for the same type must be considered as the next available term for a restriction of *Megalopyge*. The matter stands thus: If *lanata* and *nuda* are congeneric, then *Pimela* falls as a synonym of Hubner's genus. If these two are *not* congeneric, then Clemens's term must be used for *lanata* and our North American species, as the first restriction of Hubner's genus, and *Megalopyge* must be left to the type *nuda*, a species quite unknown to me. As to this and related matters, I think I can refer the student to the paper in "Papilio," above cited, in which I drew the attention of American Lepidopterists quite fully to Berg's valuable writings.

BOOK NOTICES.

"The Classification of the Lepidoptera," by Vernon L. Kellogg, American Naturalist, Vol. XXIX., pp. 248–257, plate XVII. (March, 1895).

Mr. Kellogg reviews Prof. Comstock's classification of the Lepidoptera especially in regard to the establishment of the sub-orders Jugatæ and Frenatæ (Evolution and Taxonomy), and shows how his own researches on the wing scales corroborate this division. He adds nothing essential to his former results in this direction (Kansas Univ. Quarterly, III., 45–89, 1894), and so far it appears that the wing scales do not afford a basis for the subdivision of the Frenatæ. The new part of the present article consists of a consideration of the mode of specialization of the meso- and meta-thoracic segments, as effected by a cephalization of the powers of flight. The Jugatæ are found to be in a generalized condition in this respect, but apparently not more so than certain Tineidæ; therefore, the result of this investigation is not a convincing support of Prof. Comstock's sub-orders, though it does show that the Hepialidæ belong low in the scale, as they are placed in Dr. Chapman's pupal classification. It is another argument against the old group of Bombyces.

HARRISON G. DYAR.

Notes on Butterfly Pupæ, with some remarks on the Phylogenesis of the Rhopalocera. By T. A. Chapman, M. D.

Readers of the Entomologist's Record (P. Heinsberger, 9 First Avenue, New York, Agent) will have been for some time interested in Dr. Chapman's writings. The description of the different "dresses" of the larvæ of *Arctiidæ* have shown us that the phylogeny of the different genera in this group can be studied to advantage by a systematic classification of larval characters. Each stage of the metamorphic Hexapod must be considered by itself and the larva (as we have seen from Mr. Dyar's writings) should be treated as an independent existence. The more so since the environment is peculiar and modification to meet its requirements is so abundantly displayed. In his present paper in the Record for March 15th, 1895, Dr. Chapman considers the butterfly pupa by itself. The author draws attention to the "progress which is evident in the pupæ of *Rhopalocera*, as in those of *Heterocera*, from a condition of greater to one of less freedom of the segments; to the progress from a greater number of exposed appendages (a decided 'Micro' character) to a less number, though this is not illustrated amongst butterflies except, perhaps, between Hesperids and Papilionids; and to a general progress towards a smoothly rounded, solid form, which, however, is greatly interfered with amongst the butterflies by the exigencies of the development of protective resemblance." From observation, Dr. Chapman concludes that movement is never regained by the pupa, when in course of time it has been lost through adaptation. Dr. Chapman also verifies the conclusions laid down by other students that similar structural characters have been reached along different lines by descendants from a common ancestor who did not present any indication of them.

In the course of a very remarkable *exposé* of pupal characters, Dr. Chapman takes occasion to speak very highly of Scudder's Butterflies of New England, while the author's observation of pupæ confirms Mr. Scudder's classification, not only broadly, but in considerable detail. The conclusion Dr. Chapman comes to with regard to *Papilio* is, that *Papilio* still closely represents the primeval butterfly when it had become truly a butterfly as distinguished from a Hesperid. The low rank of *Papilio* would now seem to be confirmed from the independent labours of Scudder, Comstock, Dyar, and Chapman. The genus has "fallen from its high estate," without altering the fact that the Swallow-tails are among

the most beautiful and graceful of butterflies, as well as the most interesting. As representing most nearly the primeval butterfly, *Papilio machaon*, for instance, may still be considered as typical of the group in a wide sense, no less than as typical of the particular family *Papilionidæ* to which it belongs.

Dr. Chapman's paper must be read and studied to be fully appreciated as it deserves. To draw attention to its merits, this brief notice is penned. It adds largely to the store of scientific facts; it is well and clearly written, and is the product of a mind which not only seizes small circumstances, but is able to build from them a theory of the way in which Nature has gone to work. A. R. GROTE, A. M.

"A Manual for the Study of Insects," by John Henry Comstock and Anna Botsford Comstock, Ithaca, N. Y. Comstock Publishing Co., 1895. (Price, $3.75.)

This is a work of 700 pages, profusely illustrated. A table of the classes of the Arthropoda is given, followed by a short characterization of the Crustacea. Thirty-three pages are devoted to the Arachnida, and a table is given for separating the principal families of the Araneida. The Myriapoda are briefly referred to, and Chapter III. begins the discussion of the true insects (Hexapoda). Nineteen orders are recognized, and a careful table is given for their practical determination.

In the remainder of the work, 618 pp., the several orders are treated, with tables carrying the student to the families, each illustrated by typical common species, of which brief accounts are given.

In the Lepidoptera, Diptera, and Hymenoptera, the uniform system of nomenclature of the wing-veins discussed by Prof. Comstock in "Evolution and Taxonomy" is applied throughout the orders. As stated in the preface, but slight changes are made from the usual classification of the families, except in the Lepidoptera, where the system proposed in "Evolution and Taxonomy" is adopted with slight changes. This is remarkably like Dr. T. A. Chapman's classification from pupal characters and the present writer's one on larval characters. All three agree on breaking up the old groups Zygænidæ and Bombyces, and the several members are referred to essentially the sames places. The work affords

for the first time a means for teacher as well as student to determine the family of any North American insect, for here synoptic tables replace the vague characterizations so generally in vogue in Zoology. To bring the tables down to species, as is done so satisfactorily in Botany, as the author remarks, would make the work of enormous length, not to mention the fact that the present state of our knowledge of insects does not warrant such an undertaking. The work seems a very valuable and timely one.

HARRISON G. DYAR.

[We wish to add to the foregoing notice our hearty congratulations to Professor Comstock and his talented wife upon the completion of their excellent work, and our tribute of praise for the thoroughly admirable manner in which they have performed it. It is now a little more than six years since we noticed in these pages the first part of this work, which consisted of 234 pages and 200 wood-cuts; we then stated that "judging from the portion before us, we have no hesitation in saying that the complete work will be a most valuable and admirable manual of Entomology; in clearness and simplicity of style, in excellence of illustration, and in arrangement of matter, it leaves nothing to be desired." This prediction has been most completely fulfilled, the volume before us being, in several respects, even an improvement upon the original publication. The new illustrations are more artistic, and the diagrams of wing-venation and details are clear and accurate; the synoptic tables will afford any painstaking student with satisfactory means of classifying into families any specimens that he collects, while the letter-press and figures will enable him to determine a large number of species. We heartily commend the work to all who are beginning to study Entomology, and we can assure others, who have made some progress in the science, that they will find in it a vast deal of help and information that will prove of the utmost value. We may add that the illustrations consist of 800 wood-cuts and six beautiful full-page plates, the one forming the frontispiece being coloured. The price of the work is so reasonable that it is within the reach of all.

C. J. S. B.]

CORRESPONDENCE.

BOMBYCIDÆ—ZYGÆNIDÆ.

In the April number of the CANADIAN ENTOMOLOGIST, Mr. Schaus states (p. 94) that Bombyx has no frenulum. A glance at Prof. Comstock's figure (Evol. and Taxonomy, p. 88) shows it distinct, but very small, so that difference of opinion about it may readily be entertained. This illustrates again that this character is not an adequate one for family definition. Mr. Hampson himself has already abandoned it. (Ann. and Mag. Nat. Hist. (6) xiv., pp. 254–261.)

In the same number Mr. Grote refers frequently to the Zygænidæ (p. 95). Can we not adopt some other name for this objectional term? As long ago pointed out by Westwood, Zygæna is pre-occupied in Ichthyology. Moreover, the name is entirely vague, for we have had associated under it most diverse insects belonging respectively to the more specialized Microlepidoptera (my Anthrocerina) and the higher Arctian type of the Noctuina. According to Kirby the type of Zygæna is *phegea*. Linn., an Arctian, while Hampson follows the old custom, and makes the type *filipendulæ*, a micro. I have used the terms Euchromiidæ (Syntomidæ) for the former, Anthroceridæ for the latter.

Now, we have in North America no Zygænidæ (*sensu* Hampson), as pointed out by Prof. Smith; our Pyromorphidæ are the nearest approach to them. Mr. Grote apparently uses the term for the Euchromiidæ, and only continues the confusion; for this fails to bring out the fact, which I think must finally become fully apparent, that the old family Zygænidæ must be separated into elements belonging to fundamentally dissimilar groups of the Frenatæ. Can we not entirely abandon the term Zygænidæ?

HARRISON G. DYAR.

THE ROYAL SOCIETY OF CANADA.

The fourteenth annual meeting of the Royal Society of Canada will be held at Ottawa on the 15th, 16th and 17th of May, 1895. The Rev. T. W. Fyles, South Quebec, P. Q., has been appointed to represent the Entomological Society of Ontario at the meeting.

Mailed May 1st, 1895.

The Canadian Entomologist.

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THE INSECT FAUNA OF THE SUDBURY DISTRICT, ONTARIO.

BY JOHN D. EVANS, TRENTON.

Prior to the advent of the Canadian Pacific Railway, in the year 1883, this district was entirely unsettled, being, in fact, a *terra incognita* to all except servants of the Hudson Bay Co., officials of the Geological Survey, and Provincial Government surveyors. But it had been devastated to a large extent by forest fires, which occurred at intervals during a period of some fifty or sixty years previously. These fires entirely destroyed the virgin forest (which consisted chiefly of white pine) over large tracts, by killing the trees and leaving them susceptible to the attacks of their insect enemies, and presenting at that date (1883) a desolate appearance, caused by the thickly-standing tall bare trunks and stubs of trees, among which had sprung up a thick growth of saplings of white birch, poplar, etc.

To this great destruction of timber, left to the mercy of its many insect foes and their parasites, etc., may no doubt be attributed the great variety and numbers of insects of the various orders, not to mention the pests of human existence, viz., mosquitoes, and black and sand-flies, the wood borers being especially numerous, both specifically and numerically.

Isolated patches of green pine forest were, however, left untouched among the general destruction, one of which was in the immediate vicinity of the town of Sudbury. This timber was utilized in the construction of the railway, and in after years the bark-covered stumps afforded a great number of a large series of species of insects to those in search of such inhabitants.

The writer, during a period of some seven seasons, collected in the several orders enumerated below, in the lists of which will appear the names of all the species he has as yet had worked out and determined.

List of Coleoptera.

In the following list, containing 494 species, there are sixty-five species not enumerated in the Society's list, but of these, four have been

heretofore recorded by Mr. W. H. Harrington, five by Mr. Kilman, and six by Dr. John Hamilton, as having occurred in Canada, leaving fifty to be added to the Society's list, which are designated by an asterisk. My list gives the total number of individuals of each species taken during seven years (1886, 1888–1893), and will thus show which were of common occurrence and which were rare. These were all captured within a radius of five miles from the town of Sudbury, excepting *Calloides nobilis*, Say, and *Leptura vittata*, Germ., which were taken at Algoma Mills, on Georgian Bay, distant from Sudbury about ninety-five miles. *Calosoma scrutator*, Fab., was captured by Dr. Peters within the limits of the town early in the season of 1889, from under the bark of a pine stump, where it had no doubt hibernated during the previous winter.

There are still upwards of one hundred species requiring determination. My warmest thanks are due, and are hereby tendered, to Dr. John Hamilton for his kindness in determining the majority of these species:

LIST OF COLEOPTERA TAKEN AT SUDBURY, ONTARIO.

CICINDELIDÆ.

Cicindela longilabris, Say 104
" 6-guttata, Fab 1
" limbalis, Lec..... 28
" vulgaris, Say 33
" 12-guttata, Dej 6

CARABIDÆ.

Calosoma scrutator, Fab..... 1
" frigidum, Kirby.... 5
" calidum, Fab..... 3
Elaphrus ruscarius, Say..... 1
Dyschirius nigripes, Lec..... 1
Nomius pygmæus, Dej 8
*Psydrus piceus, Lec 1
Bembidium carinula, Chd.... 1
* " paludosum, Sturm 1
" inæquale, Say.... 1
" rupestre, Dej.... 1
* " conspersum, Chd. 1
" versicolor, Lec... 3
Tachys nanus, Gyll. 11
Pterostichus coracinus, Newm.. 3
* " moestus, Say.... 1
" punctatissimus, Rand..... 1
Pterostichus lucublandus, Say. 20
" mutus, Say 4
" orinomum, Leach 3
" Luczotii, Dej.... 22
" patruelis, Dej... 1
Amara exarata, Dej 1
" latior, Kirby..... 1
" fallax, Lec 1
" erratica, Sturm..... 4
" interstitialis, Dej 5
" subænea, Lec 3
" musculus, Say 1
Platynus sinuatus, Dej..... 4
* " errans, Say..... 4
" affinis, Kirby..... 1
" melanarius, Dej.... 1
" corvus, Lec..... 1

Platynus cupripennis, Say.... 5
" 8-punctatus, Fab.... 1
" placidus, Say..... 7
" vicinus, G. & H.... 1
" obsoletus, Say..... 95
" 4-punctatus, Dej.... 7
" sordens, Kirby..... 4
" lutulentus, Lec..... 3
Lebia viridis, Say..... 3
" pumila, Dej..... 3
Cymindis cribricollis, Dej.... 1
Chlænius sericeus, Forst..... 3
" pennsylvanicus, Say. 2
Agonoderus pallipes, Fab.... 54
Harpalus viridiæneus, Beauv.. 4
" fallax, Lec..... 1
" pleuriticus, Kirby... 3
* " cautus, Dej..... 1
" rufimanus, Lec..... 2
Stenolophus fuliginosus, Dej.. 1
" conjunctus, Say.. 2
" ochropezus, Say. 1
Tachycellus nigrinus, Dej.... 3
Anisodactylus baltimorensis, Say..... 2

HALIPLIDÆ.

*Haliplus borealis, Lec..... 2
" ruficollis, Dej..... 12

DYTISCIDÆ.

Cœlambus inæqualis, Fab.... 12
*Ilybius subæneus, Er..... 11
" biguttatus, Germ..... 1
Agabus parallelus, Lec..... 1
" seriatus, Say..... 2
" infuscatus, Aubé.... 2
" gagates, Aubé..... 2
* " leptapsis, Lec..... 2
Scutopterus Hornii, Cr..... 1
Rhantus binotatus, Harr..... 15
Colymbetes sculptilis, Harr.. 7
Hydaticus stagnalis, Fab.... 2
Dytiscus fasciventris, Say.... 1
" Harrisii, Kirby..... 9
Acilius semisulcatus, Aubé... 6

GYRINIDÆ.

Gyrinus affinis, Aubé..... 1
" picipes, Aubé..... 3

HYDROPHILIDÆ.

Helophorus nitidulus, Lec.... 72
" linearis, Lec..... 2
Hydræna pennsylvanica, Kies. 1
Hydrocharis obtusatus, Say .. 1
Philhydrus nebulosus, Say . . 3
Hydrobius fuscipes, Linn..... 11
Cryptopleurum vagans, Lec .. 3

SILPHIDÆ.

Necrophorus vespilloides, Hbst..... 6
Necrophorus tomentosus, Web. 1
Silpha surinamensis, Fab..... 17
" lapponica, Hbst..... 17
" noveboracensis, Forst.. 32
" americana, Linn..... 14
Choleva clavicornis, Lec..... 1
Prionochæta opaca, Say 1
Liodes globosa, Lec..... 2
Liodes basalis, Lec..... 1
Agathidium politum, Lec..... 1

PSELAPHIDÆ.

*Bryaxis conjuncta, Lec..... 3

STAPHYLINIDÆ.

*Aleochara lata, Grav..... 12
" bimaculata, Grav. 1
Gyrophæna socia, Er.....964

Heterothops fumigatus, Lec..
Quedius lævigatus, Gyll..... 3
Listotrophus cingulatus, Grav. 13
Creophilus villosus, Grav..... 22
Philonthus æneus, Rossi..... 12
" varians, Payk..... 1
" micans, Grav..... 1
" lomatus, Er..... 2
" cyanipennis, Fab.. 1
" sordidus, Grav.... 1
Xantholinus cephalus, Say... 45
" obscurus, Er.... 2
Baptolinus macrocephalus, Nord..... 2
Lathrobium simplex, Lec..... 10
Lithocharis confluens, Say.... 6
Pæderus littorarius, Grav..... 2
Tachinus memnonius, Grav... 1
Tachyporus elegans, Horn.... 1
Boletobius cinctus, Grav..... 1
Habrocerus magnus, Lec..... 33
*Olisthærus megacephalus, Zett. 2
" substriatus, Gyll.. 27
Platystethus americanus, Er.. 4
Oxytelus rugosus, Grav..... 5
*Homalium punctiventre, Fauv. 1
Anthobium convexum, Fauv.. 18

SCAPHIDIIDÆ.

*Scaphisoma punctulatum, Lec. 1
" terminatum, Melsh 2

CORYLOPHIDÆ.

Sacium lugubre, Lec..... 5

COCCINELLIDÆ.

Anisosticta strigata, Thumb.. 11
Hippodamia 13-punctata, Linn. 33
" parenthesis, Say.. 6
Coccinella trifasciata, Linn... 39
" 9-notata, Hbst..... 4
Coccinella transversoguttata, Fab..... 35
Coccinella 5-notata, Kirby... 1
" monticola, Muls... 3
" tricuspis, Kirby... 15
" sanguinea, Linn... 1
Adalia bipunctata, Linn..... 1
Harmonia picta, Rand..... 1
" 14-guttata, Linn... 2
*Harmonia 14-guttata, var. obliqua, Rand..... 1
Harmonia 12-maculata, Gebl. 5
Anatis 15-punctata, Oliv..... 9
Chilocorus bivulnerus, Muls.. 2
*Exochomus marginipennis, Lec 1
*Scymnus americanus, Muls... 1

ENDOMYCHIDÆ.

Lypoperdina ferruginea, Lec.. 1
Mycetina perpulchra, Newm.. 3

EROTYLIDÆ.

Tritoma thoracica, Say..... 1

COLYDIIDÆ.

Cerylon castaneum, Say..... 39

CUCUJIDÆ.

Silvanus planatus, Germ..... 2
Catogenus rufus, Fabr..... 2
Pediacus fuscus, Er..... 44
Cucujus clavipes, Fab..... 3
Dendrophagus glaber, Lec... 5

CRYPTOPHAGIDÆ.

Loberus impressus, Lec..... 5

MYCETOPHAGIDÆ.

Mycetophagus flexuosus, Say.. 1
Mycetophagus pluripunctatus, Lec..... 1
Mycetophagus tenuifasciatus, Horn..... 1

DERMESTIDÆ.

Byturus unicolor, Say..... 7
Dermestes caninus, Germ.... 12
" lardarius, Linn.... 28
Attagenus piceus, Oliv..... 1
Orphilus glabratus, Fab..... 13

HISTERIDÆ.

Hister fædatus, Lec..... 4
" abbreviatus, Fab..... 2
* " marginatus 1
" depurator, Say..... 4
" Lecontei, Mars..... 4
" attenuatus, Lec..... 2
*Paromalus estriatus, Lec..... 1
Saprinus rotundatus, Kug.... 1
" fraternus, Say..... 5
Plegaderus transversus, Say... 17

NITIDULIDÆ.

*Cercus pennatus, Mun..... 6
Carpophilus brachypterus, Say. 4
Colastus truncatus, Rand..... 4
*Epuræa labilis, Er..... 8
Nitidula bipustulata, Linn.... 49
" rufipes, Linn..... 28
Omosita colon, Linn 19
Ips fasciatus, Oliv 36
" sanguinolentus, Oliv. 8
" vittatus, Say 25
*Rhizophagus cylindricus, Lec. 4

TROGOSITIDÆ.

Tenebrioides mauritanica, Linn. 1
Peltis ferruginea, Linn..... 3
Calitys scabra, Thumb..... 9
Grynocharis 4-lineata, Melsh. 4

BYRRHIDÆ.

Cytilus sericeus, Forst..... 2
Byrrhus cyclophorus, Kirby.. 3
" Kirbyi, Lec. 1

DASCYLLIDÆ.

Cyphon variabilis, Thumb ... 4

ELATERIDÆ.

Adelocera aurorata, Lec..... 2
" obtecta, Say..... 7
" brevicornis, Lec. .. 9
Alaus myops, Fab..... 11
Cardiophorus convexulus, Lec. 1
Cryptohypnus abbreviatus, Say. 5
" tumescens, Lec. 7
Elater pedalis, Germ..... 18
" nigrinus, Payk 22
" mixtus, Hbst 3
" pullus, Germ 14
" vitiosus, Lec. 14
" semicinctus, Rand 1
" luctuosus, Lec..... 50
" nigricans, Germ..... 16
" apicatus, Say 60
* " phœnicopterus, Germ.. 25
Megapenthes stigmosus, Lec.. 1
Agriotes fucosus, Lec..... 21
" limosus, Lec.....303
Dolopins lateralis, Esch..... 18
Betarmon bigeminatus, Rand. 2
Melanotus castanipes, Payk .. 34
" communis, Gyll... 1
Limonius æger, Lec..... 25
Campilus denticornis, Kirby.. 15
Sericosomus incongruus, Lec. 15
Corymbites virens, Schr..... 33
" vernalis, Hentz... 3
* " resplendens, Esch. 17
" spinosus, Lec.... 9
" caricinus, Germ.. 1
* " mendax, Lec..... 1
" insidiosus, Lec... 13
" falsificus, Lec.... 3

Corymbites triundulatus, Rand 59
" propola, Lec..... 15
" cruciatus, Linn... 62
" æripennis, Kirby..150
" metallicus, Payk.. 28
* " flavipes..... 6
Asaphes memnonius, Hbst... 1

THROSCIDÆ.

Drapetes geminatus, Say.....
Throscus constrictor, Say 3
* " Chevrolati, Bonv.. 2

BUPRESTIDÆ.

Chalcophora virginiensis, Drury 13
" liberta, Germ.... 1
Dicerca prolongata, Lec..... 53
" divaricata, Say..... 10
" tenebrosa, Kirby. ... 37
" chrysea, Melsh..... 1
" tuberculata, Chev.... 2
* " lugubris, Lec..... 3
Buprestis consularis, Gory..... 4
" maculiventris, Say.. 59
" fasciata, Fab.....207
* " sulcicollis, Lec..... 3
" striata, Fab..... 25
Melanophila longipes, Say.... 80
" fulvoguttata, Harr 3
Anthaxia æneogaster, Lap.... 11
Chrysobothris femorata, Fab.. 11
" floricola, Gory.. 1
" dentipes, Germ. 5
" trinervia, Kirby. 4
Chrysobothris scabripennis, Lap. and Gory..... 1
*Agrilus granulatus, Say..... 1
* " anxius, Gory..... 2
" politus, Say..... 2
" egenus, Gory..... 1

LAMPYRIDÆ.

Celetes basalis, Lec..... 2
Cænia dimidiata, Fab..... 1
Eros aurora, Hbst..... 39
Plateros canaliculatus, Say... 16
Calochromus perfaceta, Say. . 5
Ellychnia corrusca, Linn..... 41
Pyractomena borealis, Rand.. 4
Photuris pennsylvanica, Deg.. 38
Podabrus modestus, Say..... 36
" lateralis, Lec 14
Telephorus fraxini, Say..... 15
* " Curtisii, Kirby... 14

MALACHIDÆ.

Collops tricolor, Say 2
Anthocomus Erichsoni, Lec... 1
Dolichosoma foveicolle, Kirby. 1

CLERIDÆ.

Clerus quadriguttatus, Oliv... 5
* " nigrifrons, Say 1
" ichneumoneus, Fab... 6
Thanasimus dubius, Fab..... 24
" undulatus, Say... 2
" nubilus, Kl..... 60
Thaneroclerus sanguineus, Say. 1
Hydnocera difficilis, Lec..... 4
" verticalis, Say.... 1
* " tabida, Lec..... 2
Chariessa pilosa, Forst 1
Necrobia violaceus, Linn..... 7

PTINIDÆ.

Dinoderus substriatus, Payk.. 21
" cribratus, Lec..... 1

CIOIDÆ.

Rhipidandrus paradoxus, Beauv..... 2

(TO BE CONTINUED.)

NOTES ON COLLECTING, AND NAMES NEW TO THE CANADIAN LIST.

BY J. ALSTON MOFFAT, LONDON, ONT.

The season of 1894 was, in this locality, of rather an unusual character. Spring appeared with March, lasting up to the 25th, when we had a series of light snow-storms and hard frosts, which continued to the 7th of April. Then we had weeks of the most charming, moderate and enjoyable weather. After the middle of May we had frequent thunder-showers; the 28th was cold and snowy, with a killing frost at night. It remained cold to the 7th of June, when it changed to warm weather, and for the rest of June and throughout July we had an almost unbroken time of excessive heat. August was dry as well as hot, and its effects were seen in the coloured leaves of trees and bushes, and much more so in weeds and grasses. In the early part of September rain set in, which freshened vegetation greatly, but frosts followed at the end of the month.

I kept a look-out for *P. cresphontes*, to see if it would be as plentiful as in the previous year. During June I saw a number on the wing. On the 7th of July I got two full-fed larvæ, which matured in due time, but during the remainder of the season I did not see a specimen of *cresphontes* in any stage. Just the reverse of my last season's observations of it.

During the latter part of June and early part of July insect life was in profusion, but a combination of causes prevented me from giving close attention to it, yet I secured several interesting things new to me.

I am indebted to Professors C. H. Fernald and J. B. Smith for the following names, which are new to the Canadian list; excepting the geometer, which was identified by means of Packard's monograph:—

Plusia dyaus, Grote. Taken by Anderson. This seems to be properly a more southerly species; might easily be mistaken for *precationis*.

Bomolocha citata, Grote. Taken by Anderson. Grote says: "Our smallest species. Expanse, 19 mm."

Bomolocha toreuta, Grote. "Very recognizable from the whitish blotch on internal margin of primaries."—Grote.

Petrophora testata, Linn. I took a single specimen of this handsome insect on the 9th of August, 1894, and diligent search failed to secure another. As an example of "unequal distribution," I will mention that there are now five species of Petrophora, represented in the

Society's collection by single specimens, taken by myself, some of them many years ago, and have never met with another specimen of either of them. These are *testata*, *populata*, var. *Packardata*, *prunata*, *cunigerata*, var. *disjunctaria*, *silaceata*, var. *defluata*. They are all European, as well as American.

Elasmopalpus tartarellus, Zell. Anderson.

Exartema micantana, Fernald, M. S. This species I find only in a marshy spot at the east end of the city. I have taken it in considerable numbers during July for three seasons.

Sericoris dealbana, Walk.
" *abietana*, Fern., M. S.

Semasia cineriana, Fern., M. S. I came upon this species resting on the flowers of a purple aster on the 24th of September, 1892. On the 30th I got more, and on the 10th of October yet more. In '93 I saw two, but secured none; in '94 I did not see one; the asters were all dried up before their time for appearing came.

Semasia Goodelliana, Fern., M. S.

Steganoptycha balliana, Fern., M. S.

Ecdytolopha insiticiana, Zell. The larva of this moth is, in Prof. Fernald's Synonymical Catalogue of N. A. Tortricidæ, reported to be a borer in the stems of locust trees.

Pseudogalleria inimicella, Zell.

Depressaria argillacea, Wlsm.
" *pulvipennella*, Clem.

The two last were taken by Anderson.

We are requested to inform our Canadian subscribers that the Department of Agriculture of Ontario is very kindly issuing bound copies of the combined Reports, for 1894, of the Fruit Growers' Association and the Entomological Society of Ontario. No copy, however, will be sent to any one who has not paid his subscription for the current year. This difficulty may be overcome and the volume secured by at once sending the amount of arrears to Mr. J. A. Moffat, Victoria Hall, London, who will inform the Deputy Minister of Agriculture that such has been done.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

X. The Dytiscidæ (Dytiscini and Cybistrini) of Ontario and Quebec.

The species included in the above tribes are all large or moderate sized insects, and among them are found those in which the perfection of specialization of the ♂ tarsi reaches the highest pitch. The basal disks on the anterior feet often attain considerable dimensions, while occasionally we find three well-marked sizes of disks on the same foot—as, for example, in *Acilius*. These make beautiful preparations for microscopic study, the method of treating them being as follows: Cut off the leg a little below the knee, and place the severed piece in an aqueous 25% solution of caustic potash for a few days, until it becomes nearly transparent. Then take out of the potash and place in soft water for twenty-four hours, next removing to strong alcohol for about the same length of time. If now placed in oil of cloves for several hours, it is ready to be mounted on a slide in the ordinary way for examination by transmitted light. A great deal depends on carefully watching while in the potash solution; the specimen should not be so dark as to obstruct the light-rays to any very great extent, nor so transparent as to render the overlying parts to be separated with difficulty from the underlying, as in the latter case the chitin is often rendered so pliable as to lose the original form. Each species has its own arrangement of disk bearing hairs by which it may be separated from its congeners, though the resemblance is sometimes very close.

For the sake of convenience, I have included both of the above tribes in one generic table; of the second, the genus *Cybister* is the only representative, the tribal characters being given on page 72.

A. Length, above an inch.

Hind tarsi with one claw, anterior ♂ tarsi with four rows of equal disks..... *Cybister.*

Hind tarsi with two claws, anterior ♂ tarsi with two large and numerous small disks..... *Dytiscus.*

AA. Length scarcely exceeding half an inch.

b. Spurs of hind tibiæ acute at tip..... *Hydaticus.*

bb. Spurs of hind tibiæ emarginate at apex.

c. Elytra either sulcate (♀) or with distinct, closely-placed moderate-sized punctures..... *Acilius.*

cc. Elytra hardly distinctly punctured, sometimes appearing very finely punctulate or partially aciculate.

d. Middle thighs with long, conspicuous setæ. . *Thermonectes*

dd. Middle thighs with short, inconspicuous setæ. *Graphoderes.*

The emargination of the tips of the tibial spurs in the last three genera is very fine, and must be looked for with care, and a good lens. The other characters seem sufficiently evident if ordinary discrimination is used.

HYDATICUS, Leach.

Three of these occur, which are distinguished with some difficulty, excepting in the case of well-marked individuals, which separate thus :—

Above rufo-piceous, sides of thorax and of elytra obscurely rufo-testaceous, .50 in. . . . . *piceus*, Lec.

Above piceous, thorax rufous with black basal fascia. Elytra with distinct yellow margin.

Larger (.50 in.). Elytra with margin and usually a basal band from which extend four or five longitudinal lines, fulvous. . . *stagnalis*, Fabr.

Smaller (.48 in.). Elytra with a submarginal yellow vitta, recurved at the humerus and attenuated to the end, which is behind the middle, margin rufous towards the tip. . . . . *bimarginatus*, Say.

DYTISCUS, Linn.

Eight species are on the Canadian lists, and are easily known from all other Dytiscidæ, except *Cybister*, by their large size. The sides of the thorax and usually the front and hind margins are yellow, the outer margins of the elytra always so. They separate into groups according to the form of the labrum and of the hind coxal plates, the processes of which extend slightly over the apparent bases of the hind legs, and are divergent and either rounded, simply acuminate, or spinose at tip. The females of some species have sulcate elytra, while others are smooth. The spiracles of all make very pretty objects for the microscope, being protected by dendroid hairs which fringe the margins, and well repay the trouble of preparation. In the following table I have substituted the name *circumcinctus*, Ahr., for *anxius*, Mann., following the opinion doubtfully expressed in the Henshaw Check List.

FIG. 11.

A. Labrum nearly truncate at middle, apices of coxal processes obtuse; thorax with all the margins yellow. 1.60 in. (fig. 11.).....*Harrisii*, Kirby.

AA. Labrum distinctly emarginate at middle.

b. Coxal processes not spinose at apex.

c. Thorax with sides yellow, base and apex not or only indistinctly so.

d. Body beneath reddish, margins of ventral segments and some other markings black. 1.04–1.25 in.....*fasciventris*, Say.

dd. Body beneath blackish or piceous.

Elytral pale margin broad to apex. 1.08 in.....*hybridus*, Aubé.

Elytral pale margin narrowing to apex and with oblique subapical fascia. 1.28–1.35 in.....*verticalis*, Say.

cc. Thorax with all the markings distinctly and usually rather broadly yellow.

Coxal processes blunt at tip. 1.20 in...*sublimbatus*, Lec.

Coxal processes acuminate. 1.32 in...*marginalis*, Linn.

bb. Coxal processes spinose at apex.

Entirely pale beneath except the middle of the metasternum. 1.28 in.....*circumcinctus*, Ahr.

Under side with black markings on margins of ventral segments and on metasternum. 1.25–1.40 in.....*dauricus*, Gebl.

FIG. 12.

ACILIUS, Leach.

The two known from Canada both have females with sulcate elytra, though *fraternus* has also a smooth form. They separate with difficulty, the main characters being these:—

Fulvous above, head with base and an M-like mark on the vertex black; thorax with two transverse black lines, the anterior larger. Elytra closely irrorated with black dots and with subapical yellow fascia, posterior femora slightly suffused with black at base. .50–.56 in. (fig 12.) *semisulcatus*, Aubé.

Darker, slightly larger, more densely punctured; the mark on the vertex is not defined, the thoracic lines are broader and the femora nearly black. The sulci of the ♀ elytra are more abbreviated at base, while in the ♂ the tufts of hair on the inner edge of the three basal joints of the intermediate tarsi are much less developed than in *semisulcatus*. *Fraternus*, Harr.

THERMONECTES, Esch.

Only one Canadian form, *T. basilaris*, Harr., a somewhat convex beetle, blackish above; head with the front and a transverse line on the vertex fulvous, thorax with sides and a median transverse line of the same colour. Elytra with the external margin, a sub-basal fascia and some vague irrorations yellowish. .36–.40 in.

GRAPHODERES, Esch.

Thorax fulvous, black on anterior and posterior margins; head yellowish, the occiput and an M-like mark black. .50 in.....*cinereus*, Linn.

Smaller, testaceous, beneath rufous; head in front, sides of thorax and of elytra yellowish. .46 in..... *liberus*, Say.

According to late authorities, the name *fasciatocollis* should give way to *cinereus*, and I have accordingly used the latter.

CYBISTER, Curt.

One very large insect, *C. fimbriolatus*, Say, represents the genus with us. It is of ovate form, nearly black, but with a greenish cast, the sides of the thorax and elytra with a broad yellow margin. In the ♀ the wing covers and thorax are finely strigose with short lines, the sutural region smoother. Length, about 1.20 in.

The following are the titles of the more important works treating of the American forms of the Dytiscidæ and Haliplidæ. All have been freely used in the preparation of the foregoing pages :—

1838. Aubé., Ch. Spécies général des Hydrocanthares et Gyriniens. Paris.

1855. Leconte, J. L. Analytical table of the species of Hydroporus found in the United States, with descriptions of new species. Proc. Acad. Nat. Sci., Phila., VII., pp. 290–299.

1862. Leconte, J. L. Synopsis of the species of Colymbetes inhabiting America north of Mexico. Proc. Acad. Nat. Sci., Phila., pp. 521–523.

1873. Crotch, G. R. Revision of the Dytiscidæ of the United States. Trans. Am. Ento. Soc., IV., pp. 383–424.

1882. Sharp, David. On Aquatic Carnivorous Coleoptera or Dytiscidæ. Trans. Royal Dublin Soc., II., Ser. 2, pp. 179–1003.

1883. Horn, G. H. Miscellaneous Notes and Short Studies of North American Coleoptera. Trans. Amer. Ento. Soc., X. (Dytiscidæ, pp. 276–284).

ON TWO NEW SPECIES OF PLATYCERUS.

BY THOS. L. CASEY, U. S. A., NORFOLK, VA.

I am scarcely warranted in attempting a detailed table of this genus, because a number of species are known to me only by a single sex; but in looking over the material, it can be readily perceived that there are two sections, the first represented by *quercus*, *oregonensis* and *depressus*, being characterized by great sexual differences in the mandibles, and the second, represented by all the other species, having the mandibles unmodified in the male. The second section may be divided into three groups: the first, represented by *Agassii*, *pacificus* and *parvicollis*, which, judging by analogy, have the hind tarsi long and slender in both sexes; the second, composed of *californicus* and *thoracicus*, having the hind tarsi short, at least in the female; and the third, with stout and triangular tibiæ, at present represented by *Keeni* alone.

The name of this genus is changed in the recent Catalogue of European Coleoptera, to *Systenocerus*, Weise, but while admitting the validity of the change, I do not think that Platycerus should include the species called *Lucanus*, by Scopoli and others, because it is probable that Geoffroy did not describe any species under the name Platycerus, and the genus Platycerus, Geoff., should therefore be regarded as not published. I have not been able to consult the original work of Geoffroy, however, and am not certain that my premises are correct.

P. Keeni, n. sp.—Body very stout, convex, polished, blackish-castaneous in colour. *Head* small, coarsely and confluently punctate, two oblique subelevated areas of the occiput subimpunctate; mandibles very small, the internal tooth at the middle small and broadly triangular; antennæ short, rufo-testaceous, the scape slightly longer than the funicle, the latter compact, the three outer joints increasing gradually in width but not prolonged; club short, abrupt, compact, not so long as the funicle, three-jointed, the first abruptly, more than twice as wide as the last joint

of the funicle, more than twice as wide as long and a little wider than the second, third with a broad sensitive terminal button. *Prothorax* large, one-half wider than long, widest and narrowly rounded at the middle; sides feebly sinuate toward base, very strongly so when viewed sublaterally; apex broadly, feebly sinuate, much narrower than the base and scarcely more than one-half as wide as the disk, the latter convex, coarsely, sparsely punctate, the punctures closer near the apex, the surface rapidly declivous laterally, the side margins not reflexed. Scutellum well-developed, densely punctate. *Elytra* scarcely one-third longer than wide and but slightly more than twice as long as the prothorax, at base equal in width to the disk of the latter; humeri exposed, obtusely angulate; apex very broadly rounded; disk sparsely, moderately coarsely punctate, the punctures uneven in arrangement, with scarcely any trace of punctured series, alternate intervals subcostiform. *Legs* moderate in length, very stout; femora coarsely, sparsely punctate; tibiæ triangular, very stout, coarsely, asperately punctate and seriately setose; tarsi short and stout, the posterior much shorter than the tibiæ. Hypomera setose. Length, 12.5 mm.; width, 5.7 mm.

Queen Charlotte Island.

Though somewhat allied to *californicus*, this species is readily distinguishable by its larger size, obese form, subcostulate elytra and very stout legs. The bilaterally symmetrical club may possibly be a sexual character, as I am under the impression that there is a specimen of *californicus*, in the cabinet of Mr. Rivers, having a similar antennal character; if so, the hind tarsi of the *californicus* group are short in both sexes.

This interesting species was discovered by Rev. J. H. Keen, and the original specimen kindly given me for description by Mr. Wickham, with permission of Mr. James Fletcher, of Ottawa. It has recently been taken in abundance.

P. thoracicus, n. sp.—Stout, convex, moderately shining, black, with a scarcely visible piceous tinge. *Head* small, coarsely, confluently punctate, a median area at base subimpunctate; mandibles very small; antennæ short, black, the scape slightly longer than the funicle, the latter a little longer than the club, with the joints compactly joined, the sixth scarcely wider and not inwardly prolonged; club in great part sensitive, the two basal joints about twice as wide as long, more developed internally, the last transversely ovulate and eccentrically attached. *Prothorax* large, one-half wider than long, widest and more strongly rounded

at basal third; sides rapidly convergent toward base and deeply sinuate at the basal angles, the latter right; apex feebly sinuate, but slightly narrower than the base and two-thirds as wide as the disk, the latter feebly impressed along the basal margin, feebly explanato-reflexed at the sides, and coarsely, very closely punctate, the punctures sparser near the centre. *Elytra* nearly one-half longer than wide, distinctly more than twice as long as the prothorax, at base not as wide as the disk of the latter; disk coarsely, not very closely, unevenly punctate, with tolerably uniform but unevenly impressed series of coarser punctures. *Legs* moderate in length, rather slender; femora remotely punctate; tibiæ slender, not much wider at apex, with impressed series of asperate punctures, seriately setose; tarsi short, stout, but slightly more than one-half as long as the tibiæ. Hypomera coarsely and scarcely confluently punctate, very inconspicuously setose. Length, 11.0 mm.; width, 5.9 mm.

California.

Differs radically from *Keeni* in the structure of the antennal club and tibiæ. It is related to *californicus*, but differs conspicuously in its obese form and larger prothorax, and also in its coarser and much denser sculpture throughout. The types of both this species and *Keeni* are apparently females.

NOTES ON HYMENOPTERA.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The advent of another collecting season finds me with a very large proportion of my last year's captures still undetermined, and in many instances even unexamined. A few remarks, however, in regard to my success with the Hymenoptera may induce some of our younger members to pay more attention to this order. Probably 500 species were collected, a large proportion of which were of the smaller forms, and it seemed, indeed, that many of the larger species were much less numerous than in some seasons. Special attention was given to the collection of the microhymenoptera, for these are so poorly represented in Canadian collections. In making a rough summary of the species, I find about 125 species belonging to the *Aculeata*, and 100 to the *Phytophaga*, the remainder being distributed among the different families of parasitic forms. There are many interesting additions to my collection, and many gaps have been filled in. Mr. Ashmead's monograph of the *Proctotrypids* has made it abundantly evident that the knowledge of the

Canadian species was very limited, and I made a special effort to obtain as many examples as possible. I took altogether about 350 specimens, and now find that over 50 species are represented. This will give any collector an idea of what he may expect to secure if he have the necessary patience to preserve and mount so much small and inconspicuous material. In separating my species I have found most difficulty with the sub-family Belytinæ, in which several of the genera have proved stumbling-blocks, which I attribute, however, to my deficient study of them, and not to any lack in the excellent work of Mr. Ashmead. As some of the species are still undetermined, a list would be imperfect, but the genera represented are as follows:

Isobrachium, Anoxus, Perisemus, Goniozus, Gonatopus, Phorbas, Lygocerus, Megaspilus, Ceraphron, Aphanogmus, Telenomus, Prosacantha, Hoplogryon, Gryon, Caloteleia, Macroteleia, Hoploteleia, Scelio, Proctotrypes, Leptorhaptus, Acropiesta ?, Belyta ?, Oxylabis, Cinetus, Pantoclis ?, Zygota, Aclista ?, Spilomicrus, Paramesius, Aneurhynchus, Galesus, Loxotropa, Tropidopria, Diapria, Ceratopria, Phænopria, Basalys, Polymecus, Isocybus, Helorus.

Among the additions to the Canadian fauna are the following:—

Isobrachium myrmacophilum, Ashm., ♂; *Anoxus Chittendenii*, Ashm., ♂; *Goniozus foveolatus*, Ashm., ♂; *Gonatopus flavifrons*, Ashm., ♀; *Phorbas laticeps*, Ashm., ♀; *Calotelcia Marlattii*, Ashm., ♂ ♀; *Macroteleia virginiensis*, Ashm., ♀ ♂, and *Hoploteleia floridana*, Ashm., ♀.

I have recently had the pleasure of examining a small collection of Hymenoptera made by Mr. William Metcalfe, of Toronto, and which contained a few species not yet taken at Ottawa, and several others which are rare. Mention may be made of *Cræsus laticulus*, Nort., ♀; *Nematus similaris*, Nort., ♀ (the Locust saw-fly); *Sciapteryx punctum*, Prov., ♀; *Macrophya pulchella*, Klug., ♀; *Pamphilius ruficeps*, Hargtn., ♀; *Xyela minor*, Nort., ♂ ♀; *Ibalia maculipennis*, Hald., ♀; *Ichneumon hospitus*, Cress., ♀; *Mesostenus sagax*, Prov., ♀; *Cteniscus annulipes*, Cress., ♀; *Xylonomus canadensis*, Hargtn, ♀; *Isobrachium myrmecophilum*, Ashm., ♀; *Tachytes crassus*, Patton, ♀ ?; *Philanthus ventilabris*, Fabr., ♀; *Euspongus bipunctatus*, Say, ♀; *Ceratina tejonensis*, Cress., ♂.

The last species is much like small specimens of *C. dupla*, Say, but seems to be distinct by the strongly angulated femora. It has been recorded by Provancher (Faune Entomologique, Vol. II., p. 812), who received two specimens from Mr. Brodie, of Toronto.

EUDRYAS STÆ. JOHANNIS REDIVIVUS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Readers of the CANADIAN ENTOMOLOGIST will recall the controversy between Prof. Smith and myself as to the species described by Walker as *Eudryas Stæ. Johannis*, the type of which was examined in 1867 by Grote & Robinson, and pronounced a distinct species allied to *grata*. I had supposed the insect owed its name to the St. John's River, Florida, but, according to Mr. Smith (C. E., XXIV., 133), the type bore a label that it was taken on a church door in England. Mr. Smith, relying on the label, invented the theory that: "in some way the pupa of the insect was transported to England, and through the vicissitudes encountered an aberration was produced." This writer has "no hesitation in referring the species as a suffused aberrant *grata*." There is *no* band on the hind wings, but, nevertheless, it is set down as a "suffused" specimen of *grata*, which always, so far as known, *has* a band! For my answer to this, see my paper, CAN. ENT., XXV., 320, where, aided by Mr. Tutt's memoranda as to the given English locality on the label, I discussed the *pro* and *con.* of the above theory. Now I am in receipt of a letter from Mr. Schaus, that *Eudryas Stæ. Johannis* has been re-discovered in Mexico. My kind correspondent writes: "It will interest you to know that I have recently seen several specimens of *Eudryas Stæ. Johannis*, Walk., from Mexico; they were sent to Mr. Druce by a native who is now collecting." Thus the theory of the "vicissitudes of the voyage" vanishes; the specific validity of *Stæ. Johannis* asserted by us in 1868, before Mr. Smith was (entomologically speaking) born, is vindicated. But more than this: the sequel shows that, instead of adopting the more credible theory that Walker's "type" had in some way been provided with a label belonging to a different specimen, Mr. Smith thought it "probable that in some way the pupa of the insect was transported to England." Having pinned his faith to the label, Mr. Smith then constructed the theory of "suffusion" to account for the differences, and then invented the "vicissitudes of the voyage" to account for the "suffusion." I think it is now plain that sufficient proof is offered that Mr. Smith blindly accepts a label, and that this throws light upon his work in his recent Catalogue, where he has accepted whatever Mr. Butler showed him as being Walker's "types"; whereas the fact is, that Walker did not label his "types" as such, and the specimens now so designated have been shifted and sorted out by Mr. Butler. I have offered evidence that the specimens now shown as the

"types" of *Acronycta cristifera*, *Xylina signosa*, *Hormisa absorptalis*, are not the specimens seen in their original position by myself, Prof. Fernald, and Grote & Robinson. Probably other cases exist. The basis of a specific name is found in literature, not in a collection or a supposed "type." A label may be changed or lost, a specimen may be substituted; the description is clearly the only warrant for the name that cannot be altered. The manner in which Mr. Smith speaks of Walker's and Guenée's "types," as if he knew anything certain about the specimens shown him as such, his neglect in each and every case to compare the British Museum "type" with the Lists, stamps his method, pursued in the "Catalogue," as uncritical, if not "unscientific." Mr. Smith has made a number of remarks based on the fact that, in Mr. Neumoegen's collection, I am supposed to have labelled some specimens (from memory) of difficult Agrotids wrongly. If the fact is really so, these determinations were never intended to be published, but the magnitude of my fault, amplified by Mr. Smith, really pales before the fact that, in the "Revision," Mr. Smith unites my *cupidissima*, *orbis* and *lætula*, and invents another *Eudryas Stæ. Johannis* theory (p. 25), that I had "confounded two distinct species, one with open orbicula and one with closed"; while in the Catalogue, after seeing my types, he separates as distinct the three species (p. 56), and abandons the positively stated theory of the "Revision" without a word of apology.

But though the mystery of *Stæ. Johannis* is now cleared up, as to the home of the species, and its undoubted validity, the "type" in the British Museum is still without a certain locality. If *Stæ. Johannis* is found in Mexico, may it not be found on the banks of the St. John's River, in Florida, also? Is it not now somewhat probable that the "type" was really collected there by Doubleday? At any rate, Florida collectors will do well to look for the species, which belongs apparently to the Tropical fauna of America north of the Equator. We have, then, three allied species of the genus forming a group by themselves: *grata*, Fab.; *Stæ. Johannis*, Walk., and *cypris*, Grt. As to the name for the genus, I have given the argument. No one living, probably, regrets more than I do that, in the strict letter of the law, we must abandon the beautiful Wood Nymph for *Euthisanotia*, and use for *timais*, according to Berg's restriction, the name *Xanthopastis*. Thus the type of *Euthisanotia* would be *unio*, and with this, *brevipennis*, Stretch, from California, seems strictly congeneric. I wish Mr. Dyar would examine *Stæ. Johannis* and *grata*, to see if this group offers any structural distinctive characters.

REMARKS ON APATELODES SUGGESTED BY AN ARTICLE BY MR. SCHAUS.

BY HARRISON G. DYAR, A. M., NEW YORK.

Mr. Schaus, in describing some new species of South American moths (Proc. Zool. Soc., Lond., 1894, p. 233), casually refers the genus Apatelodes to the Eupterotidæ. As this genus has been placed among the Notodontidæ by American authors, it may be worth while to examine the arguments for this position.

The Eupterotidæ of Hampson are a series of mostly large moths from India, with geometriform markings, of a peculiar and rather characteristic appearance. The body is proportionately rather small and slender, and the fringes of the wings are long. Their hairy vestiture, broad wings and short cell suggest the Lasiocampidæ, where they are placed by Kirby. They are, however, frenate, and with the venation essentially of Notodontidæ, but without the accessory cell. Two genera, at least, are included (Gangarides and Cnethocampa), which differ considerably in habitus. In these, the body is stouter proportionately, the wings are narrower and the cell longer, while the general appearance suggests the Notodontidæ rather than the other Eupterotidæ. Mr. Hampson separates these families by the absence of the tongue in the Eupterotidæ; but, as this member seems to be equally lacking in the notodontian Melelopha (Ichthyura), the separation seems hardly very sharp.

Of the larvæ, I only know those of Cnethocampa (Thaumetopœa, Hubn.). Unfortunately, these belong to the atypical section just referred to, and it is hardly fair to judge the Eupterotidæ by these. Very little can be positively made out from figures, usually; though that of the larva of *Eupterota fabia* seems to exhibit the same type of structure as Cnethocampa. Judged on these data, the larval Eupterotidæ belong to the Lymantriid section of the Noctuina, characterized by the presence of warts, three warts above stigmatal wart on the last two thoracic segments. They differ from the Lymantriidæ by the reduction of wart v. instead of iv. and the presence of secondary hairs.

To turn now to Apatelodes. In *angelica* there is a little accessory cell on a long stalk; but in *torrefacta* there is none, and veins 7–8 and 9–10 arise as two pairs from a short furcation of the long stalk from apex of cell. The hind wings are frenate and the tongue is wanting. The habitus is not that of the typical section of the Eupterotidæ, but there is

nothing positive to distinguish it from the other group represented by Gangarides and Cnethocampa.

The larva of *torrefacta* certainly possesses a fine development of secondary hairs; but so does Datana and, to a less degree, Malalopha. Unfortunately, the secondary coating is so well developed that the warts, even if present, are obscured, and I cannot make out their arrangement on the thorax. On the abdomen, the pale spots representing the wart areas rather suggest the retaining of wart iv. at the expense of v.; but the character is so faint that nothing definite can be argued from it.

Thus we see that nothing at present contradicts the position assigned to Apatelodes by Mr. Schaus; though, on the other hand, nothing positive confirms it. Shall we add the family Eupterotidæ to our lists on this evidence?

I would like to remark that if it should turn out, as I now suspect, that the Lasiocampidæ belong to the Lymantriid section of the Noctuina, and that Mr. Schaus is right in assigning Apatelodes to the Eupterotidæ, then the close resemblance of *A. angelica* larva to a lasiocampid, to which I have referred [See Ann. N. Y. Acad. Sci., Vol. VIII., p. 229], may be better understood.

A FEW POINTS IN COLLECTING ICHNEUMONIDÆ.

BY G. C. DAVIS, AGRICULTURAL COLLEGE, MICH.

The Ichneumonidæ have habits and peculiarities as distinctly their own as other families and orders of insects. In collecting them one will find, after a little experience, that certain species or even groups will frequent certain places where conditions are favourable and their host is likely to be found.

The *Pimplinæ*, with long ovipositors, should be sought for in a wooded region around dead or diseased wood, where their hosts, the borers, are at work. One of the best places I have found for collecting them is around piles of dead block-wood cut the preceding winter. They are most common in Michigan in June and early July. *Xylonomus* and *Grotia* may often be found as pupæ in the hollow stems of shrubs in the spring, where they have already destroyed their host and are securely wrapped in a papery case of their own. The portion of the subfamily with shorter ovipositors, such as *Pimpla* and *Glypta*, apparently work on caterpillars, and are quite as common during the fall as in the summer. The *Ophioninæ* are much the most common in the fall. The

Ichneumoninæ and *Cryptinæ* are the earliest to appear; in fact, I have taken many hibernating specimens of *Ichneumon* and *Amblyteles* safely stored away amid the frost, in some old rotten log or under loose bark.

In collecting species of *Ichneumon*, *Cryptus* and *Ophioninæ*, I have had my best success by collecting along a dense, moderately high hedge-fence, and amongst bushes and low trees bordering a forest or a swamp. A person will succeed much better if he will select one spot and watch the specimens as they pass him, rather than to keep constantly on the move. Sometimes better success will come from selecting several spots not far from each other, and collecting alternately from each one.

Three years ago this season I accidentally happened on a little ruse that has since yielded me many rare specimens that otherwise I am sure I should never have obtained. It is merely trampling down a few of the bushes in some spot on the edge of the thicket where one wishes to collect. As an Ichneumonid comes along, it will almost invariably make a slight halt over or near the trampled vegetation. The halt, though hardly noticeable, is sufficient for one to scoop the specimen with the net. The rare *Ichneumon albomarginatus*, Cr., is such a shy and rapid flyer that I was never able to capture one until this method was used. The *why* of this method is probably explained by the fact that the bruised plants give off a similar odour to what they would were they eaten by some caterpillar, and the parasite halts to look for the cause of the odour.

Late in the autumn, after frosts have killed the flowers, and larvæ have mostly pupated, I have been very successful in collecting *Tryphoninæ* and other *Ichneumonidæ* on a little isolated group of larches, located on our college grounds. The parasites and wasps found something to feed upon that attracted them for at least two weeks. There were no plant-lice to be found, and apparently it was the pitch or resin.

The wingless *Pezomachus* I have most commonly found on herbaceous plants in waste places. The best method of securing them is by sweeping. A collector may have fair success in sweeping for other parasites, especially the smaller species, but generally his catch will consist mostly of the commoner species. With a little practice, a collector will accustom his eye so that he will readily spy even the minute Ichneumonids as they approach him on the wing. Of course, rearing parasites is a very desirable way of obtaining them, but we must both rear and collect if the greatest progress is to be made.

PRELIMINARY STUDIES IN SIPHONAPTERA.—V.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (Division III.)

TABLE OF SPECIES.

A. Head gently and evenly rounded from occiput to mouth; eyes in anterior half of head, about equally distant from upper and lower edges; antennal groove in middle of head; mandibles reaching two-thirds of anterior coxæ.....*B.*

AA. Head more or less distinctly angled in front above, not evenly rounded from occiput to mouth; head combs of 5 to 6 spines; in anterior tarsi joint 1 equals 3; in middle tarsi joint 2 a little shorter than 5; in posterior tarsi joint 2 equals 5 and as long as 3 and 4 together, while 1 is one-half longer than 2; abdominal segments with one row of bristles above and below; posterior femora with a row of bristles on the side.....*D.*

B. Abdominal segments above each with three rows of bristles, each row with 8 to 12 bristles on either side, below two rows, the first with 4 to 7, the second with 6 to 7 bristles on either side; eye small; bristles on joint 2 of antennæ as long as joint 3; maxillary palpi in female with joint 2 two-thirds of 4, and 3 about one-half of 4; labial palpi 5-jointed; head combs with 1 or 2 spines on either side; pronotal comb of 20 spines; in middle tarsi joint 2 three-fifths of 1, 2 one-fourth longer than 5, 5 more than twice 4, and 1 as long as 3, 4 and 5 together; in posterior tarsi joint 1 as long as 2 and 3 together; 5 a little more than one-third of 1, while 2 is more than 3 and 4 together, and more than 4 and 5 together; apical spine on joint 2 of hind tarsi shorter than joint 3; posterior femora without a row of bristles on the side; colour, light reddish-brown; length: female, 4 mm.....*gigas.*

BB. Abdominal segments above each with one row of bristles, 5 to 8 on either side; below one row of 2 to 4 bristles on either side; eye very large; bristles on joint 2 of antennæ shorter than joint 3; maxillary palpi with joint 2 about equalling 4, and 3 two-thirds of 4; labial palpi 4-jointed; in anterior tarsi joint 3 three-fourths of 2, 5 about two and one-half times 4, and less than 1 and 2 together; in middle tarsi 2 one-half longer than 1, 5 two and one-half or three times 4, 1 about equalling 3; in posterior tarsi joint 5 more

than one-half of 1, 2 as long as 3 and 4 together; posterior femora with a row of bristles on the side..... *C.*

C. Head combs of 6 to 9 spines, pronotal comb of 14 to 18 spines; in anterior tarsi joint 3 about equals 1; in middle tarsi 2 equals 5 or less; in posterior tarsi 1 as long as 2 and 3 together, and 2 less than 4 and 5 together; apical spines on joint 2 of hind tarsi as long or longer than joint 3; male claspers oval, the broad portion pointing up and back, thickly finely haired around the upper end; colour, dark brown above, lighter below; length: female, 2.5–3 mm.; male, 1.5–2 mm..... *serraticeps.*

CC. Head combs of 2 to 3 spines, pronotal comb of 6 spines; in anterior tarsi joint 3 longer than 1; in middle tarsi joint 2 one-fifth longer than 5; in posterior tarsi 1 about one-third longer than 2, 2 one-fourth longer than 5; apical spine on joint 2 of hind tarsi longer than joints 3 and 4 together; male claspers inverted shoe-shaped, the toe pointing backward, moderately hairy above; colour, dark brown; length: female, 3 mm.; male, 2.5 mm..... *erinacei.*

D. Maxillary palpi with joint 2 as long as 3 and 4 together, and 3 three-fourths of 4; head obtusely angled in front above; eye large, at the middle, and nearer the upper than the lower edge; antennæ in posterior half of head; bristles on joint 2 as long as joint 3; labial palpi 4-jointed; mandibles reaching to end of anterior trochanters; pronotal comb of 16 spines; in anterior tarsi joint 3 three-fourths of 2, 4 shorter than 3, 5 as long as 2, 3 and 4 together; in middle tarsi 3 slightly longer than 4, 1 much longer; apical spine on second joint of posterior tarsi longer than joints 3 and 4 together; dorsal rows of bristles on abdominal segments with 5 to 8 bristles on either side, ventral with 2 to 4 on either side; male claspers as in *erinacei*, except not so rounded, and very thickly hairy above; colour, dark brown; length: female, 1.75–2.25 mm.; male, 1.5 mm..... *inaequalis*, n. sp.

DD. Maxillary palpi with joints of equal length; head sharply angled in front above; eye moderate, in anterior half of head, and about equally distant from upper and lower edges; mandibles reaching to two-thirds of anterior coxæ; pronotal comb of 12 spines; in anterior tarsi joint 5 nearly as long as 2, 3 and 4 together; in middle tarsi 3 as long as 4, 1 a little longer; male claspers narrow, curved backward, thickly haired above; colour, yellowish brown; length, 2 mm..... *goniocephalus.*

Pulex gigas, Kirby.

1837. Kirby, Faun. Boreali-Amer. IV., p. 318, pl. 6, fig. 9 (P. gigas).

I have referred to this species, specimens taken on cotton-tail rabbit at Lansing, Michigan. The spines on the cheeks are easily overlooked,

and often broken entirely off. It is one of the largest and most well-marked of the known North American fleas. Ritsema, to whom the species was unknown, suggested that it might possibly be identical with *Hystrichopsylla obtusiceps*. This was, however, merely a guess, as it does not bear the slightest resemblance to that species. It was orginally described from specimens taken in Canada.

Pulex serraticeps, Gervais.

1832. Duges, Ann. d. Sci. Nat. XXVII., p. 157, pl. 4, fig. 2, 5–9 (P. canis).

1835. Bouche, Nov. Act. Acad. Leop. Carol. XVII., 1, p. 505 (P. felis).

1844. Gervais, Hist. Nat. des Insectes. Apteres. III., p. 371, pl. 48, fig. 8 (P. serraticeps).

This is the common cat and dog flea, well-known from all parts of the world. Besides various wild cats and dogs, it has been reported from *Herpestes ichneumon*, *Foetorius putorius*, *Hyaena striata*, *Lepus timidus*, and *Procyon lotor*. It is also stated to occasionally sip human blood. I have specimens from various parts of North America, and also from Europe.

Pulex erinacei, Bouche.

1835. Bouche, Nov. Act. Acad. Leop. Carol. XVII., 1, p. 507 (P. erinacei).

I have received a series of specimens of this species from Dr. Taschenberg, taken in Germany on Erinaceus europeus, which is the only known host.

Pulex inaequalis, n. sp.

Mr. A. B. Cordley sent me a series of specimens of this species taken on cotton-tail and jack rabbits, near the Grand Canon in Arizona. It seems to be the North American representative of *goniocephalus*, but differs very widely from that species as described and figured by Dr. Taschenberg. A variety of this species, which I will call var. *simplex*, occurs on a species of *Lepus* in Michigan. It may eventually prove to be a good species, but it bears such a close resemblance to *inaequalis* that I cannot at this time recognize it as more than a variety of that species. The slightly larger size, 2.5 mm., the head combs of 8 spines, and the pronotal comb of 14 spines, will separate it from the typical form, while the proportions of the tarsal joints and other details are nearly identical.

Pulex goniocephalus, Taschenberg.

1880. Taschenberg, Die Flohe, p. 82, pl. III., fig. 20 (P. goniocephalus.

Recorded from Europe as occurring on hares and rabbits, *Capra ibex*, and *Canis vulpes*.

[TO BE CONTINUED.]

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LIST OF COLEOPTERA COLLECTED AT MASSETT, QUEEN CHARLOTTE ISLANDS, B. C.

BY REV. J. H. KEEN.

The beetles enumerated below were all taken within a circle of five miles' radius from Massett, on the Northern Shore of Graham Island—the most northerly of the Queen Charlotte group. This area, though small, is considerably diversified, and favourable to coleopterous life. The island here is flat, and covered with a forest of spruce and hemlock, with a sprinkling of alder. The soil is sandy, and for the most part dry. The coastline includes a stretch of level sand reached only by the highest tides, and strewn with driftwood; a protected pebbly beach and a tract of rough stones, also covered by the high tides. The sandy beach I find most productive, many even inland insects appearing to fall on the loose sand, and, being unable to rise, crawl for shelter under the driftwood. Hills and fresh-water streams (of any size) are absent, and I quite expect these situations, which occur in other parts of the island, to yield, when examined, several additional species.

These islands enjoy a temperate, though extremely humid, climate. Sunshine is rare, rain of almost daily occurrence. Snow seldom falls in any quantity, and usually disappears quickly. Once in six or eight years the thermometer falls to zero; usually, however, a few degrees of frost mark the extreme of cold. No regular meteorological record is, I regret to say, kept here.

As intimated above, this list does not pretend to exhaust the Coleoptera of the locality; indeed, fresh species are still constantly occurring. It has been thought well, however, to print the list as it at present stands, and to supplement it with another at a later date.

I should like to express here my great indebtedness to my friend, Mr. James Fletcher, of Ottawa, as well as to the learned specialists whose aid he has enlisted in the preparation of this list. Mine has been simply the easy and pleasant work of collecting the specimens; their's, the diffi-

cult and complicated task of determining and collating them. Bearing this in mind, the reader will find no difficulty in rightly apportioning whatever commendation he may have to bestow.

[The extremely interesting collection of Coleoptera, of which the following list gives the names of those species up to the present identified with certainty, has been made by the Rev. J. H. Keen during the past three years. It was hoped to have published with each species extensive notes and figures of several new to science which Mr. Keen has discovered; but this proves to be impossible just now. As so little is known of the fauna of the Queen Charlotte Islands, every care has been taken to ensure the correct identification of the species. Thanks are particularly due to the following specialists who have given much time to examining and naming the different species and comparing them with Eastern forms:—Dr. J. Hamilton, Dr. C. V. Riley, Mr. L. O. Howard, Dr. Geo. H. Horn, Capt. T. L. Casey, Mr. H. F. Wickham, and Mons. A. Fauvel, of Caen, France. Figures (now in course of preparation) and descriptions of new species, together with fuller notes of the rarer species, will appear later. The numbers given are those of Henshaw's list.—J. FLETCHER.]

96. Cychrus marginatus, Fish.—Not uncommon.

96. Cychrus marginatus, Fish., var. Fulleri, Horn.—Common under logs in woods from May onwards. Several times taken in act of feeding on snails.

106. Cychrus tuberculatus, Har.—Frequent under logs from April onwards.

169. Loricera 10-punctata, Esch.—Rare. In moss near lake in February.

176. Notiophilus sylvaticus, Esch.—Occasionally under logs in warm, dry places.

180. Leistus ferruginosus, Mann.—Occasionally under rotten bark of prostrate logs.

184. Nebria diversa, Lec.—Numerous in spring with *N. Sahlbergi* under driftwood on beach.

195. Nebria Sahlbergi, Fish.—Frequent under logs on beach from May onwards.

221. Dyschirius 3-dentatus, Lec.—Numerous on gravelly beach at high-water mark in June.

315. Bembidium erasum, Lec.—Not common. Ground, July 22, 1891.

375. Bembidium indistinctum, Dej.—Numerous on sandy banks of salt inlet.

425 Bembidium spectabile, Mann.—One specimen.
426. Bembidium oblongulum, Mann.—Scarce. Under logs at edge of ponds.
484. Trechus ovipennis, Mots.—Not common. Under logs on beach
500. Pterostichus crenicollis, Lec.—Common from April onwards.
503. Pterostichus validus, Dej.—Not rare.
508. Pterostichus amethystinus, Dej.—Common. Seen *in cop.* February 26th.
509. Pterostichus castaneus, Dej.—Rare. Under bark.
583. Pterostichus Luczotii, Dej.—Common all summer on grassy beach.
653. Amara scitula, Zimm.—One only in June.
657. Amara impuncticollis, Say.—Abundant.
670. Amara interstitialis, Dej.—Rare.
1164. Tachycellus nigrinus, Dej.
1168. Tachycellus badiipennis, Hald.—Not rare; in grass tufts.
1275. Bidessus affinis, Say.—Very common.
1349. Hydroporus tartaricus, Lec.—Occurs sparingly.
1352. Hydroporus tristis, Payk.—Abundant throughout year. Seen *in cop.* on March 25th.
1379. Ilybius subæneus, Er.—Common.
1422. Agabus æruginosus, Aubé.—Common.
1459. Rhantus binotatus, Harr.—Common.
1474. Colymbetes exaratus, Lec.—Occasional.
1492. Acilius semisulcatus, Aubé.—Occasional.
1529. Gyrinus picipes, Aubé.—Numerous in ponds from May onwards.
1551. Helophorus inquinatus, Mann.—Under driftwood in sandy beach, 23rd May, 1893.
1646. Hydrobius scabrosus, Horn.—Not rare; on submerged logs in running streams.
1653. Hydrobius fuscipes, L.—Very rare. May. Shallow ponds.
1665. Cercyon fimbriatus, Mann.—Abundant in rotten sea-weed, June—August.
1676. Cercyon adumbratus, Mann.
Cercyon humeralis.—Common in decaying grass. On wing during March and April.
1670. Cercyon fulvipennis, Mann.
1680. Cercyon analis, Payk.—Frequent under excrement in summer.
Cercyon lateralis, Marsh.—Common.

1692. Leptinus testaceus, Müll.—From a living shrew, September 9, 1892.
1701a. Necrophorus Melsheimeri, Kirby.—Abundant from May onwards.
1702. Necrophorus vespilloides, Hbst.—Occasional.
1706. Silpha lapponica, Hbst.
1715. Necrophilus hydrophiloides, Mann.—Abundant, especially during winter. Active under carrion even during snow.
1716 Pelates latus, Mann.—Abundant under logs and loose bark. Seen *in cop.* February 16th.
1719 Agyrtes longulus, Lec.—January 3. In flood refuse. Several taken.
1720. Sphærites glabratus, Fab.—Common during summer, under carrion.
1722. Pinodytes cryptophagoides, Mann. From June to September, under logs.
1724. Catoptrichus Frankenhæuseri, Mann.—Somewhat rare. Under carrion in autumn.
1725. Choleva egena, Horn.—Two skimmed from surface of flood refuse in meadow, 14th Oct., 1893.
1726. Choleva luridipennis, Mann. (also one specimen of a black variety). Abundant during autumn, under carrion.
1741. Ptomaphagus pusio, Lec.—Rare in hen's nest, 6th November, '91.
Hydnobius, probably n. sp.—In rotten grass, 17th June, 1892.
1769. Anisotoma humeralis, Horn.—January 3. In flood refuse. A few taken.
1803. Agathidium concinnum, Mann.—Under bark in December. Not common.
1804. Agathidium rotundulum, Mann.—Rare. Under carrion. January 3. In flood refuse. Abundant.
1807. Agathidium pulchrum, Lec.—Rare. Taken from mud gallery made by ants on trunk of dead alder.
1847. Scydmænus biformis, Makl.—Not common. In moss at tree roots in February.
1899. Batrisus frontalis, Horn.—Not common. In ants' nests.
1941. Bryaxis albionica, Mots.—Occasionally in winter, in moss at tree roots.
1955. Faronus parviceps, Makl. — One specimen taken on wing in September.
2025. Homalota granularis, Mann.—Common in sea-weed.

2026. Homalota maritima, Mann.—Common. Frequents stones near low-water mark on beach.

2027. Homalota picipennis, Mann.—Numerous in June, under excrement.

2033. Homalota geniculata Makl.—Common on beach in loose dry sand near high-water mark. Under driftwood. Shaken from rotten sea-weed, June 3. Emerged and took flight on sand being pressed, April and May.

2036. Homalota comparabilis, Makl.—One taken in April, under driftwood on sandy beach.

2039. Homalota fucicola, Makl.—June 3; in rotten sea-weed.

2040½. Homalota atricornis, Fol.—Not common. Under excrement in August.

Homalota fungi, Grav.—Common under excrement during summer; rotten grass in June; occasionally in turf in winter.

Homalota ingrata, Fvl.—Numerous under carrion in May. Jet black. Legs dusky yellow.

Aleochara californica, Fvl.

2056. Aleochara castaneipennis, Mann., var. with rufous elytra.—Common under carrion, all summer.

2057. Aleochara sulcicollis, Mann.—Numerous under rotten sea-weed.

2058. Aleochara cognata, Makl.

Aleochara littoralis, Makl.—Under driftwood on beach.

2064½. Oxypoda crassicornis, Fvl.—January 4. Common in flood refuse.

9292. Autalia elegans, Casey.—Numerous in August.

Bryobiotos Keeni, Fvl., n. sp.—Occasional in June, under stones on sandy beach, between tide marks. Larvæ in same place.

Phytosus Fletcheri, Fvl.—Rare; taken in May under driftwood.

2071. Bolitochara notata, Makl.—(=Californica, Casey).—Occasional; under bark. One in June, 1893, in rotten grass. Three on carrion in March.

2075. Leptusa.—Occasionally under bark. March to October.

Heterothops asperatus, Fvl., n. sp.—Several taken in April, under driftwood on sandy beach.

9479. Quedius erythrogaster, Mann.—Rare; in manure heaps in May and June.

2101. Quedius sublimbatus, Makl.—Occasional; in moss in winter.

Quedius marginalis, Makl.—Occurs occasionally in summer in rotten grass.

2103. Quedius capucinus, Grav.—Common during summer.
2105. Quedius lævigatus, Gyll.
2119. Creophilus villosus, Grav.—Common.
2120. Hadrotes crassus, Mann.—Abundant in rotten sea weed.
2149. Philonthus æneus, Rossi.—Common under carrion in summer.
2150. " furvus, Nord.
2214. " Siegwaldi, Mann.
2222. " nigritulus, Grav.
2221. " picipennis, Makl.
2258. Cafius canescens, Mann.—Common under rotten sea-weed; under log on sandy beach, April 28.
2259. Cafius seminitens, Horn.—Common.
2261. Cafius luteipennis, Horn.—Not uncommon during spring, under logs on sandy beach.
2264. Cafius femoralis, Makl.—Frequent in April, under driftwood or sandy beach.
2298. Baptolinus macrocephalus, Nord.—Common, under bark.
2311. Stenus Juno, Fab.—Under log, in March and June; not numerous.
2354. Stenus brevipennis, Makl.—Dec. 10; in moss, in March.
2427. Stenus adspector, Makl.—Abundant in turf at all times.

Actocharis.—? March 3; under log on beach.

Haida Keeni, Fvl.—Not common. Found in moss at roots of trees, in December.

2565. Liparocephalus brevipennis, Makl.—In autumn, swarming under stones on the Massett beach.
2566. Liparocephalus cordicollis, Lec.

Diaulota insolita, Casey.—Common in August, on barnacle-covered stones on beach.

2606. Tachinus maculicollis, Makl.—In fungi, in August.
2607. Tachinus semirufus, Horn.—Occasionally under rotten fruit, in July.
2627. Tachinus Crotchii, Horn.—Numerous in summer, in rotten grass.
2659. Boletobius cingulatus, Mann.
2664. Boletobius 3-notatus, Er.—On fungi, in August; occasional.

Mycetoporus seriaticollis, Fvl, n. sp.—Rare. Moss. A few taken in flood refuse, in December.

2746. Bledius albonotatus, Makl.—Numerous in May; burrowing in sand between tide marks.

2753. Oxytelus fuscipennis, Mann.—Common throughout summer, under excrement.

2763. Haploderus linearis, Lec.—Very numerous on under side of planks on ground, in March ; occasional in rotten grass, in October.

2785. Ancyrophorus biimpressus, Makl.—Common among rotten leaves in woods, in winter.

Thinobius pygmæus, Casey.—Numerous on pebbles between tide marks, in June.

2812. Amphichroum testaceum, Mann.—Numerous in May, on skunk cabbage.

2817. Amphichroum maculatum, Lec.—Beaten from spruce trees, in April and May.

2820. Tanyrhinus singularis, Mann.—March 18, on under side of log near small stream. Three only, though carefully sought for.

2821. Trigonodemus striatus, Lec. var. or nov. sp.—In flood refuse, 13th October, 1893.

2823. Lathrimæum subcostatum, Makl.—Often beaten from spruce, from May onwards ; also under carrion.

2824. Lathrimæum fimetarium, Makl.—Abundant under carrion during spring and autumn.

Lathrimæum Keeni, Fvl., n. sp.—Several in rotten sea-weed, in June.

2835. Acrulia tumidula, Makl.—Common throughout year, under bark ; occasionally under carrion, in November.

2838. Homalium strigipenne, Makl.

2841. Homalium pusillum, Grav.—Under chips in woods, May 30. Common. Seen *in cop.* in June. Whole body reddish, blotched with black.

Homalium arpedinum, Fvl., n. sp.—Common in April and May, under loose bark of felled spruce.

2843. Homalium foraminosum, Makl.

2847. " humile, Makl.

Homalium irregulare, Fvl.—Abundant during May, in crab and other blossoms.

9354. Homalium algarum, Casey.—Under logs and driftwood on sandy beach, May, November.

Homalium concinnum, Marsh.—Common under manure. One in wasp's nest, August 24, 1894.

Homalium striatum, Grav., var.—One or two under carrion, in December.

Homalium florale, Payk, var.—One under carrion, in March.

2863. Anthobium pothos, Mann.

2871. Orobanus simulator, Lec.—In moss on submerged log in running stream, April 7. Two only taken.

2878. Protinus limbatus, Makl.—Occasional, in rotten fungi, in September.

2878a. " Maklini, Fvl.—One taken on wing, March 23.

" brachypterus, Fab.

Protinus basalis, Makl.—Abundant during spring and autumn, under carrion. Seen *in cop.* November 13.

2882. Megarthrus pictus, Mots.—Occurs sparingly, from April onwards. In rotten grass, in September.

2886. Megarthrus atratus, Makl.—Not common. Under excrement, in July.

Triogonurus nebrioides, Fvl.—Rare, under loose chips lying on dry spruce log, in August.

2906. Micropeplus laticollis, Makl.—Rare. Found in April, under chips.

2907. Micropeplus punctatus, Lec.—Several taken in June on bank of small stream. They emerged on water being thrown on the bank.

2912. Micropeplus brunneus, Makl.—Frequent during June and July, on newly-cut spruce logs, under half-detached chips. Seen *in cop.* in June.

(TO BE CONTINUED)

ENTOMOLOGICAL NOTES.

FROM J. ALSTON MOFFAT, LONDON, ONT.

Mr. C. G. Anderson, of this city, has a friend who is an electric-light trimmer, and began last summer taking the insects that he could conveniently secure whilst on his rounds of duty. When looking over this material recently, Mr. Anderson observed a sphinx moth that seemed strange to him; so he brought it to me to determine, when it proved to be *Dilophonota ello*, Linn., which is the first reported appearance of this Southern moth that I have heard of since the autumn of 1886, when a number of specimens of it were taken by various persons in different parts of the country.

Whilst "sugaring" on the 24th of April, Mr. Anderson found on the side of a tree a *Catogenus rufus*, Fab., as a male, paired with a *Cucujus clavipes*, Fab., as the female.

THE INSECT FAUNA OF THE SUDBURY DISTRICT, ONTARIO.

BY JOHN D. EVANS, TRENTON.

(Continued from page 146.)

LUCANIDÆ.

Platycerus depressus, Lec.... 23

SCARABÆIDÆ.

Aphodius fossor, Linn.... ... 7
" hamatus, Say..... 2
" fimetarius, Linn... 37
* " crassulus, Horn... 1
" granarius, Linn.... 9
" vittatus, Say..... 11
" inquinatus, Hbst... 1
" leopardus, Horn... 2
Dichelonycha elongata, Fab.. 88
" subvittata, Lec. 163
Serica vespertina, Gyll..... 10
Diplotaxis tristis, Kirby... .. 2
Lachnosterna fusca, Fröh.... 10
* " inspersata, Smith 5
Euphoria fulgida, Fab 1
Osmoderma scabra, Beauv... 1
Trichius affinis, Gory..... 73

CERAMBYCIDÆ.

Asemum mœstum, Hald..... 60
Criocephalus agrestis, Kirby.. 16
Tetropium cinnamopterum, Kirby..... 4
Phymatodes dimidiatus, Kirby. 18
Merium proteus, Kirby..... 1
Calloides nobilis, Say..... 1
Xylotrechus sagittatus, Germ. 15
" colonus, Fab.... 1
" undulatus, Say.. 62
" lunulatus, Kirby. 6
* " interruptus, Lap. 4
Clytanthus ruricola, Oliv..... 6
Rhagium lineatum, Oliv..... 14
Pachyta monticola, Rand.... 1
" liturata, Kirby..... 1
" rugipennis, Newm... 1
Acmæops proteus, Kirby..... 83
" pratensis, Laich... 54
Gaurotes cyanipennis, Say.... 16
Bellamira scalaris, Say..... 5
Typocerus velutinus, Oliv.... 2
Leptura subhamata, Rand.... 5
" sexmaculata, Linn... 22
" nigrella, Say..... 16
" canadensis, Fab..... 41
" erythroptera, Kirby.. 14
" sanguinea, Lec..... 5
" chrysocoma, Kirby...256
" proxima, Say..... 14
" biforis, Newm..... 3
* " pedalis, Lec..... 1
" vittata, Germ..... 1
" sphæricollis, Say..... 3
" mutabilis, Newm.. . 16
* " viridipennis, Hald... 3
Monohammus scutellatus, Say. 77
" confusor, Kirby 47
Hyperplatys maculatus, Hald. 1
Acanthocinus obsoletus, Oliv. 2
Pogonocherus penicellatus, Lec..... 3
Saperda mœsta, Lec..... ... 1
Oberea ruficollis, Fab..... 1

CHRYSOMELIDÆ.

Donacia palmata, Oliv..... 10
" piscatrix, Lac..... 1
" proxima, Kirby..... 10
" subtilis, Kunze..... 1

Donacia æqualis, Say..... 8
* " confusa, Lec..... 3
Orsodachna atra, Ahr..... 54
Syneta ferruginea, Germ..... 15
Cryptocephalus 4-maculatus, Say..... 16
*Cryptocephalus venustus, Fab. 5
Pachybrachys femoratus, Oliv. 2
" infaustus, Hald. 2
Diachus auratus, Fab..... 4
* " pallidicornis, Suffr... 7
Xanthonia 10-notata, Say.... 4
Adoxus vitis, Linn..... 34
Chrysochus auratus, Fab..... 2
Paria canella, Fab..... 3
" 4-notata, Say..... 4
Prasocuris obliquata, Lec.... 1
Doryphora 10-lineata, Say.... 5
Chrysomela elegans, Oliv..... 5
" Philadelphica, Linn 11
" spirææ, Say..... 3
" Bigsbyana, Kirby. 14
Gastroidea polygoni, Linn.... 21
Lina lapponica, Linn.....121
* " scripta, Fab..... 2
Gonioctena pallida, Linn..... 22
Phillodecta vulgatissima, Linn. 1
Phyllobrotica discoidea, Fab.. 16
Diabrotica 12-punctata, Oliv.. 1
Adimonia rufo-sanguinea, Say. 1
Galeruca sagittaria, Gyll..... 3
" decora, Say.....118
Œdionychis quercata, Fab.... 2
Disonycha alternata, Ill..... 5
Haltica bimarginata, Say.... 127
" chalybea, Ill..... 1
" carinata, Germ..... 6
" inærata, Lec..... 1
Crepidodera Helxines, Linn 56
Systena hudsonias, Forst..... 19
Phyllotreta vittata, Fab..... 8
Psylliodes punctulata, Melsh.. 4
Odontota nervosa, Panz..... 2

TENEBRIONIDÆ.

Phellopsis obcordata, Kirby.. 5
Iphthimus opacus, Lec..... 9
Upis ceramboides, Linn..... 83
Haplandrus concolor, Lec. .. 25
Tenebrio tenebrioides, Beauv.. 5
Blapstinus interruptus, Say... 1
Tribolium madens, Charp.... 1
Platydema americanum, Lap. 41
Hypophlæus parallelus, Melsh. 59
Boletophagus corticola, Say... 1

CISTELIDÆ.

Hymenorus niger, Melsh. ... 2
* " communis, Lec . 1
Isomira quadristriata, Coup.. 14

LAGRIIDÆ.

Arthromacra ænea, Say.....126

MELANDRYIDÆ.

Penthe obliquata, Fab..... 1
Melandrya striata, Say.....
Emmesa connectens, Newm.. 1
Phryganophilus collaris, Lec.. 12
Xylita lævigata, Hellw..... 18
Scotochroa atra, Lec..... 4
Serropalpus barbatus, Schall.. 3
Eustrophus confinis, Lec..... 1
* " repandus, Horn.. 1
Stenotrachelus arctatus, Say.. 2

PYTHIDÆ.

Crymodes discicollis, Lec....167
Boros unicolor, Say..... 21
Pytho americanus, Kirby..... 73
Priognathus monilicornis, Rand..... 10

OEDEMERIDÆ.

Calopus angustus, Lec..... 4
Ditylus cæruleus, Rand..... 5

MORDELLIDÆ.

Anaspis nigra, Hald..... 5
" flavipennis, Hald.... 7
Mordella borealis, Lec..... 1
" melæna, Germ..... 1
" scutellaris, Fab.... 6
" marginata, Melsh... 1
Mordellistena scapularis, Say. 1

ANTHICIDÆ.

Nematoplus collaris, Lec..... 1
Anthicus formicarius, Laf.... 3

PYROCHROIDÆ.

Dendroides concolor, Newm.. 4

MELOIDÆ

*Meloe impressus, Kirby..... 2
" americanus, Leach.... 3
Macrobasis unicolor, Kirby... 51
*Pomphopœa Sayi, Lec..... 4

RHINOMACERIDÆ.

Rhinomacer pilosus, Lec..... 3

RHYNCHITIDÆ.

Rhynchites cyanellus, Lec.... 5

ATTELAEIDÆ.

Attelabus bipustulatus, Fab... 1
" rhois, Boh.. 4

OTIORHYNCHIDÆ.

Otiorhynchus ovatus, Linn... 1

CURCULIONIDÆ.

Sitones flavescens, Marsh.... 2
Trichalophus alternatus, Say.. 1
Lepyrus colon, Linn..... 7
" geminatus, Say..... 8
Pissodes strobi, Peck..... 4
" affinis, Rand..... 56
" dubius, Rand..... 1
Hylobius confusus, Kirby.... 104
Hypomolyx pineti, Fab..... 2
Dorytomus mucidus, Say..... 23
" brevicollis, Lec... 2
" longulus, Lec.... 3
Procas Lecontei, Bedel..... 1
Lissorhoptrus simplex, Say... 17
*Magdalis hispoides, Lec..... 1
Anthonomus scutellatus, Gyll. 1
" signatus, Say.... 13
" helvolus, Boh... 4
* " rufipennis, Lec.. 7
" corvulus, Lec... 3
* " cratægi, Walsh..
Orchestes niger, Horn..... 15
Elleschus bipunctatus, Linn.. 47
" ephippiatus, Say... 8
Cryptorhynchus bisignatus, Say 1
Ceutorhynchus decipiens, Lec. 1

SCOLYTIDÆ.

Pityophthorus materiarius, Fitch..... 8
Pityophthorus puberulus, Lec. 1
Xyloterus bivittatus, Kirby... 21
Xyleborus cælatus, Eich..... 11
Dryocœtes autographus, Ratz. 8
Tomicus calligraphus, Germ.. 21
" cacographus, Lec... 26
" pini, Say..... 2
Hylesinus opaculus, Lec..... 1
Dendroctonus terebrans, Oliv. 199
" simplex, Lec... 14
Hylurgops glabratus, Zett.... 24

ANTHRIBIDÆ.

Eurymycter fasciatus, Oliv.... 1
Cratoparis lunatus, Fab..... 2

SPRING COLLECTING IN ALBERTA.

BY F. H. WOLLEY DOD, CALGARY.

Perhaps the following short account of a few days' spring collecting here may be of interest to readers of the CANADIAN ENTOMOLOGIST.

The locality I have worked from during the two years that I have been in the country, is close to the mouth of Fish Creek, about twelve miles south of Calgary, and a mile from the right bank (south) of Bow River. I have a fellow worker about nine miles further west, near the head of Pine Creek, by name Mr. Arthur Hudson, a keen observer, and, I believe, the only entomologist besides myself who has ever collected here for a whole season, and between us we are at present almost daily increasing the list of macro-lepidoptera found around Calgary. We have already over fifty species of butterflies on the list, with three or four more doubtful species, and are confident that we shall be able to make several additions during the coming season. Of the moths, more particularly the Noctuidæ (and their name here is certainly Legion !), new comers never cease, as I think Prof. Smith can testify. When Mr. Elwes paid me a visit in July, 1893, he asked: "Treacle is not much used here, is it?" I replied that I had only been "at it" for a month, and was fairly well pleased with the result, though of course my take might have been exceptional. Were I asked the same question now, I should, without hesitation, reply: "Well, just *isn't* it, that's all, and from June to October, too!" During last July I not unfrequently counted from sixty to eighty moths on a treacle patch about eighteen inches long and three or four wide, comprising about fifteen or sixteen species. A sight such as that, however, certainly *is* exceptional. However, I have other modes of collecting to speak of now, as at this early date treacle is scarcely worth working.

The season commenced this year on March 29th, on which date Mr. Hudson netted at dusk a species of *Litholomia napæa* (hibernated). I saw *Vanessa milberti* on the following day. On 31st a few species of *Calocampa cineritia* showed up at treacle. Sallows were in flower in sheltered spots on April 22nd, and, it being a fairly warm night, I ventured forth, with the shattered remains of an old parasol into which to shake the moths. I felt fairly confident of some success, as I thought to myself that sallows in flower mean that spring moths have hatched; such at least has been my experience in the Old Country. At the first shake, down come several *Calocampa cineritia* and *Litholomia napæa*, both hibernated, I suppose, but some of them looking none the worse. I shake the next

tree, and down again come the same two species in crowds, especially *cineritia*, one of which comes down my neck, with a fat noctuid larva to keep it company. Such are the evils of shaking sallows, though when the trees are from eight to twelve feet high, reaching the blossoms is out of the question. And, after all, I believe shaking pays best, except for geometræ, which take wing in preference to dropping. The few next trees yield the same species, one specimen of *Tæniocampa pacifica*, and one of another form, which Prof. Smith says is also *pacifica*, but my observation of the two forms this spring has led me to believe that he is mistaken. Forcing my way through a thicket of sallow bushes does not agree with the poor old parasol; it caught me many moths last spring, and I am loth to part with it, but the cover has now more holes than silk, and the framework is broken beyond repair, so it is left to be ignominiously chewed by cows. I have now to shake my moths on to mother earth, or, better still, in some instances, into water. A bath seldom seems to injure them, and when lying on the surface of water they are easily seen, and if out of reach of the hand can be fished out with a long stick. *Calocampa cineritia* appears rather to appreciate a dip, at least I should judge so from the fact that I frequently leave them lying inert on the water, after I have picked out all the more desirable "fry." *T. pacifica*, on the other hand, seldom lies still on the water, and from the way it skims along the surface until it finds some twig or terra firma, might almost be called a good swimmer. A few more trees are tried and two specimens of *T. pacifica* appear on the water. Ah! There is a fine form, just out of reach; I look around for a stick to fish him out, but before I can find one, away he skims across the pool as though he had suddenly recollected a pressing engagement on the opposite bank. He has not gone far before there comes a splash, and the rings on the water diverging from the spot where I last saw my fine form of *pacifica* tell me that he has gone to assist the internal economy of a young jack. About an hour's work sees me "through" for the night, and after 10 p.m. I have never found a second visit to sallows pay. The catch consists, besides the above-mentioned species, of one *Ufeus satyricus* and one *Scopelosoma devia*, both, I suppose, hibernated, though both are fine specimens, particularly *devia*. The following night a visit to the same sallows results in the same species, and in addition, two specimens of an undescribed Mamestra, *Xylina Georgii* (1) and *Tachnobia salicarum* (1). *T. pacifica* is decidedly on the increase, and what a variable species it is, too! To-night *Litholomia napæa* is

less common. April 27th sees me "at it again." The temperature is 44° and the air is still. To-night there is a decided falling off in the numbers of *C. cineritia* and *L. napæa*, and an increase in *T. pacifica*. I take also *Calocampa nupera* (1), *Mamestra* (undescribed) (1), and one each of two species entirely new to me; one of them apparently a Tæniocampa,—can it be an extreme form of *pacifica*?—and the other I should say allied to *Xylina;* but, alas! my conjectures as to the generic position of species often prove to be very wild indeed, so little have I studied classification. On the 28th I pay a visit to Mr. Hudson. He *searches* his blossoms, and nets moths flying around them, and his take has been even better than mine. In addition to most of the species I have mentioned, he has come across a species of Cucullia new to me, taken with the net only, and at least one fresh Tæniocampa. Some of my species, too, have been more common with him, such as *Scopelosoma devia* (in splendid condition), *Tachnobia salicarum*, and the supposed Xylina; also *Scopelosoma tristigmata* (2). However, he has not come across the above-mentioned Mamestra, n. sp., nor one or two of the others which fell to my lot. On 27th he took *Plusia californica* and *Erebia discoidalis*, perhaps a record date for the latter species, and a week earlier than I observed it last year. On April 30th I saw *E. discoidalis* (1) and *Argynnis freya* (1), and a species of Pieris, near the forks of Fish Creek, about twenty miles west of here. I have certainly a record for *Chionobas alberta*, Elwes., which I saw this year on May 3rd. Work at sallows this week is not very prolific, and in fact *T. pacifica* is nearly over. Treacle on May 3rd produced *C. cineritia* (common), and Mamestra, n. sp. (5), nothing more. On the 5th I again visit Mr. Hudson. A cold breeze is blowing from north-west, but on my way I find *Chionobas alberta* fairly common on a hillside. This species, a full description of the life-history of which will probably appear in No. XVI. of Mr. Edwards's "Butterflies of North America," appears to have a marked preference for dry, stony hillsides, where the grass is stunted in growth; just such localities, in fact, where abounds that large anemone so common in this district. But this morning the wind, and a large, slow-travelling cloud, which presently obscures the sun, prevent my taking more than a dozen specimens. In the afternoon Mr. Hudson and myself have fair sport amongst *Argynnis freya* in a deep coolie, sheltered from the wind. Here we find a sprinkling of *E. discoidalis*, but only one *C. alberta*, which prefers, despite the wind, to keep on higher ground. One specimen of a species of Eupithæcia, several of a small yellow "Carpet," and one of a probable species of Boarmia, complete the list up to date.

A NEW AEGIALE (MEGATHYMUS).

BY DR. HENRY SKINNER, PHILADELPHIA, PENNA.

Aegiale Streckeri, n. sp., ♂.—Expands from 2¼ inches to 3 inches. *Upper side.*—Superiors rich brown, but not as bright, nor has the brown as much red in it, as in *yuccæ*. There are three sub-apical costal white spots; a lemon-yellow spot at end of cell; there is a row of five yellow spots running across the wing, parallel with the exterior margin; the upper two are small and square in shape; the lower three are small and triangular, and there is one in each of the three median interspaces. The inferiors have a yellow marginal border about ⅛ inch in width, the wing being otherwise immaculate, and is clothed with long, silky brown hair. *Under side.*—Superiors have the spots repeated. Inferiors are gray, with a varying number of small white spots—one specimen having two and the other five. The female is larger and has the same number of spots as the male; the three sub-apical spots are white and the remainder yellow; in the female the five spots on the wing are in two series, the two upper being nearer the exterior margin, and the three lower are nearer the base; in other words, they do not form a continuous line as in the male. This species has been confounded, in collections, with *cofaqui*, Strecker, which was described from a female. The male of *cofaqui* is marked practically like the female, but the male has the long hair on the inferiors as in the new species. This long hair is also conspicuous in *Streckeri* at the base of the superiors below. This fine species is described from two males in my own collection; one is from Texas and the other probably from Arizona (the exact locality not being known in either case), and a pair in the collection of Dr. Herman Strecker, of Reading, Pa.; one of these is from Texas, and was collected by the late Jacob Boll, and the other from the San Juan reconnaissance, made under the charge of Lieut. Ruffner, in Colorado, in 1877. Of the four described species, *Neumoegeni* is very different from the other three; *yuccæ* may be known by the peculiar white spot on the anterior margin of the secondaries below. The spots on the superiors above in *Streckeri* are small, and all practically of one size, and form a straight row, while in *cofaqui* the spots are very large, being a quarter of an inch in length; the secondaries above are also spotted in this species. *Streckeri* differs in colour very much from the other species, not being nearly so red.

LOSSES CAUSED BY DESTRUCTIVE INSECTS.

In the May number of *The Century*, Vol. L., No. 1, p. 89, 1895, there is recorded an item of interest to economic entomologists that is liable to be overlooked and lost, although it deserves a better fate. In an article by Mr. William E. Smythe, on "The Conquest of Arid America," there is given a carefully-compiled table of all of the expenditures of "the Church of Jesus Christ of Latter Day Saints," in Utah, the figures being furnished, at the author's request, by Mr. A. Milton Musser, Church historian, and by him submitted to the inspection of the Presidents and Bishops of the Church, prior to publication. The figures cover a period of forty years, and the estimates are stated to be "as fair as they can be given." The one to which the attention of entomologists is here directed reads as follows:—

"Loss sustained by crickets, locusts and grasshoppers, $2,500,000."

It is interesting to compare this amount with other items. For instance, the loss by fire during the same period was but $800,000; building of churches and schools, $4,000,000, or less than double the loss by insect depredations; the cost of local telegraph and railroad lines, $3,000,000; cost of immigration and sustaining the poor, $8,000,000; taxes, $8,000,000.

As the estimates cover the first 40 years of the existence of the settlement, the figures are of especial value to us, as this is the period during which it is always the most difficult to obtain information.

F. M. WEBSTER, Wooster, Ohio.

NOTE AS TO CRITICISMS OF A PAPER PUBLISHED BY MR. A. G. BUTLER, ON "THE NATURAL AFFINITIES OF THE LEPIDOPTERA REFERRED TO THE GENUS ACRONYCTA," IN THE TRANSACTIONS OF THE NEW YORK ACADEMY OF SCIENCES.

Mr. Harrison G. Dyar says (p. 57), in his references to a paper by Mr. A. G. Butler, on "The Natural Affinities of the Lepidoptera referred to the Genus *Acronycta*," that he has "not seen any refutation of Mr. Butler's arguments, etc.," and comes to the conclusion that "Mr. Butler's position appears to have been ill-founded." If Mr. Dyar refers to *The Entomologists' Record*, Vol. I., pp. 269–271; Vol. II., p. 82; Vol. II., pp. 104–106; Vol. II., p. 150; *British Noctuæ and Their Varieties*, Vol. IV., p. xxiii., he will find that Mr. Butler's paper has been very severely criticised by various entomologists, quite sufficiently, I have no doubt, to have deterred any one in touch with entomological work in Europe from "adopting his conclusions."

J. W. TUTT, Westcombe Hill, London, S. E.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XI. The Hydrophilidæ of Ontario and Quebec.

These water-beetles differ from Dytiscidæ especially in having the antennæ terminated by a distinct club instead of being filiform; and while, as the name implies, they are usually found in ponds or streams, they are much more feeble swimmers than the Dytiscids, and are exponents of a more generalized type. Several genera are truly terrestrial in habit, the beetles occurring about decomposing animal matter or in manure. The larvæ somewhat resemble those of the Dytiscidæ in general appearance, but differ so far as my experience goes in having toothed mandibles instead of the single suctorial ones characteristic of the other family. Pupation takes place on land in an underground cell, or in a cavity scooped out beneath a stone or piece of wood.

The generic table is based chiefly on the characters used in the LeConte and Horn "Classification," and it is hoped will prove useful. Care must be given the small specimens, and it will be found impracticable to separate them without a good lens. The genera recorded in the Canadian lists separate as follows:—

A. Prothorax narrower than the elytra, and usually narrowed behind; form elongate, sculpture usually rough.
  b. Elytra with ten striæ or rows of punctures, max. palpi moderate.
    c. Last joint of max. palpi longer than preceding.
      Antennæ 9-jointed..... *Helophorus.*
      Antennæ 7-jointed..... *Hydrochus.*
    cc. Last joint of max. palpi shorter than preceding.. *Ochthebius.*
  bb. Elytra with more than ten rows of punctures, maxillary palpi very long..... *Hydræna.*

AA. Prothorax at base as wide as the elytra, narrowed anteriorly. Form usually convex, oval or elliptical, sculpture usually weak.
  d. Middle and hind tarsi with first joint short.
    e. Tarsi compressed, metasternum with distinct spine.
      f. Prosternum sulcate, metasternal spine long.
        Large species (over 1 in. long), last joint of max. palpi shorter than the preceding..... *Hydrophilus.*
        Smaller species (less than ½ in. long), last joint of max. palpi equal to or longer than preceding. ..... *Tropisternus.*
      ff. Prosternum carinate, metasternal spine short.. *Hydrocharis.*

ee. Tarsi not compressed, metasternum not prolonged into a spine.
g. Last ventral segment emarginate..... *Berosus.*
gg. Last ventral not emarginate.
h. First and second ventrals concealed by plates..... *Chætarthria.*
hh. Ventral segments uncovered.
i. Antennæ 8-jointed, colours mostly pale, form rounded, convex..... *Laccobius.*
ii. Antennæ 9-jointed, colours usually dark.
j. Terminal joint of max. palpi shorter than preceding.
k. Tarsi 5-jointed on all the feet.
Mesosternum with longitudinal lamina..... *Philhydrus.*
Mesosternum with slight median tuberosity..... *Helochares.*
kk. Tarsi 4-jointed on middle and hind feet.
Mesosternum with feeble transverse carina, claws simple..... *Cymbiodyta.*
Mesosternum with compressed conical process, claws broadly toothed at base..... *Helocombus.*
jj. Terminal joint of max. palpi longer than the preceding.
Elytra striate or striato-punctate.... *Hydrobius.*
Elytral punctuation confused.... *Crenephilus.*
dd. Middle and hind tarsi with the first joint elongate.
l. Mesosternum narrow, prosternum carinate.
Larger species; scutel elongate..... *Sphæridium.*
Smaller species; scutel equilateral..... *Cercyon.*
ll. Mesosternum very wide, prosternum with elevated flattened median area.
Prothorax margined..... *Megasternum.*
Prothorax not margined..... *Cryptopleurum.*

HELOPHORUS, Fabr.

These insects are of a more or less elongate form and rough sculpture; they may be found in numbers by stirring up the bottom near the banks of pools, when the beetles will float to the top of the water,

where they may easily be seen and taken, since they swim very poorly, and are unable to dive rapidly. The species reported from Old Canada are eight in number, one of which *(obscurus)* may be erroneously identified, having been originally described from the Colorado River. The differential characters are :—

A. Size larger (.23 in.), head and thorax shining, sparsely punctulate, the latter sparsely granulate at sides, median sulcus slightly undulate.....*oblongus*, Lec.

AA. Size less (.13–.18 in.).

b. Elytra tuberculate (.13 in.).....*tuberculatus*, Gyll.

bb. Elytra not tuberculate, alternate interspaces higher (.13 in.).....*inquinatus*, Mann.

bbb. Elytral interspaces not tuberculate nor alternating.

c. Hind angles of thorax obtuse.

d. Sides of thorax rounded in front, nearly straight behind (.18 in.).....*lacustris*, Lec.

dd. Sides of thorax regularly rounded.

Legs testaceous, median thoracic sulcus undulate (.17 in.).....*obscurus*, Lec.

Legs piceous, tibiæ and tarsi testaceous, median thoracic sulcus nearly straight (.12 in.).....*nitidulus*, Lec.

cc. Hind angles of thorax rectangular.

Thorax not narrowed at base, sides nearly straight, elytra clouded with fuscous (.12 in.).....*linearis*, Lec.

Thorax slightly narrowed at base, sides subsinuate, elytra with fuscous markings, of which an inverted post-median sutural V and two spots each side are most obvious (.10–.15 in.).....*lineatus*, Say.

HYDROCHUS, Leach.

Four species which are found in the same situations as *Helophorus* belong here, and, while differing considerably in facies from that genus, would at once be recognized as allied to it. The thorax is much narrower than the elytra, and the breadth only about equal to, or very slightly exceeding, the length.

A. Smaller (.10 in.), elytral interstices not distinctly alternating, nor interrupted; thorax scarcely narrowed behind, sides straight, scarcely crenulate, basal foveæ deep.....*simplex*, Lec.

AA. Larger (.13–.15 in.), elytral interstices alternating, and more or less interrupted.

b. Striæ as wide or wider than the interstices.

Sides of thorax sinuate (.15 in.).....*squamifer*, Lec.

Sides of thorax crenulate (.13 in.).....*excavatus*, Lec.

bb. Striæ narrower than the interstices (.13 in.)..*subcupreus*, Rand.

OCHTHEBIUS, Leach.

These are amaller insects than the preceding, though of much the same habits. In some parts of the Southwest they are so numerous that thousands of specimens may be taken from a small pool by stirring up the borders. They are particularly partial (in my experience) to such small ponds as have been formed by the partial drying of a small stream fed by springs. Dr. Horn has found them most abundant in shallow running water, adhering to the under side of stones. All are rather flattened, somewhat roughly sculptured little beetles, some of which look like very small Helophori, while others remind us by their shape of *Corticaria*. The table is extracted almost entirely from that lately published by Dr. Horn in the Trans. Am. Ento. Soc. for 1890.

A. Thorax abruptly sinuate from middle, or deeply notched near the hind angles. Transparent border broad.

b. Thorax with well-marked discal foveæ.

Disk of thorax sparsely punctate (.06–.08 in.)..*discretus*, Lec.

Disk of thorax impunctate (.07 in.).....*nitidus*, Lec.

bb. Thorax without discal foveæ, coarsely punctate (.08 in.).....*cribricollis*, Lec.

AA. Thorax gradually sinuately narrowed from apex to base, transparent border narrow.

Discal impressions of thorax forming continuous line ; lateral foveæ broad and moderately deep (.06 in.)..... .....*sculptus*, Lec.

Discal impressions very vague, the posterior only distinct ; the lateral foveæ in the form of indistinct sinuous impressions (.06–.08 in.)..... .....*Holmbergi*, Mann.

HYDRÆNA, Kug.

H. pensylvanica, Kies., is found under the same conditions as *Helophorus* and *Ochthebius*. It is a small blackish insect (.075 in.), the feet, palpi and margin of thorax testaceous. Thorax sub-quadrate, densely punctured, impressed at sides, elytra sub-opaque, with rows of sub-quadrate punctures.

HYDROPHILUS, Geoff.

Includes two very large black insects, the giants of the family as represented in America. They separate thus :—

Less elongate, more convex, abdomen pubescent, the last three segments narrowly smooth at middle, without yellow spots at sides (1.25 in.).....*ovatus*, G. & H.

Fig. 13.

More elongate, less convex, first abdominal segment pubescent, the remainder broadly smooth at middle, and pubescent only at sides, which are ornamented with large triangular yellow spots (1.30–1.45 in.), (fig. 13).*triangularis*, Say.

TROPISTERNUS, Sol.

The three species on the Canadian lists are very smooth, shining insects, mostly black above, and often extremely common in ponds. They are among the best swimmers of the family.

Sides of thorax and elytra yellow (.33 in.).....*nimbatus*, Say.

Entirely black above.

Surface finely and equally punctured (.40 in.).....*glaber*, Hbst.

Surface unequally and more coarsely punctured (.35 in.) *mixtus*, Lec.

HYDROCHARIS, Latr.

H. obtusatus, Say, represents this genus. It is easily recognized by the size (.60 in.), and by the elytra being so obtuse behind that the posterior portion of the body is more blunt than the anterior.

BEROSUS, Leach.

Very convex, rather elongate beetles of pale colours, with darker maculations in the form of thoracic and elytral spots. Quite possibly the record of *infuscatus* may be incorrect.

Abdomen cristate in ♂, the fifth segment with one tooth at middle (.16 in.).....*peregrinus*, Hbst.

Abdomen never cristate, fifth segment bidentate at middle.

Elytral striæ nearly obliterated on disk (.20–.24 in.).....*infuscatus*, Lec.

Elytral striæ distinct and punctured on disk (.16–.20 in.).....*striatus*, Say.

CHÆTARTHRIA, Steph.

Two very small convex species, .05 or .06 in. long, are representatives of this genus. They occur on the margins of streams and ponds, and separate easily thus :—

Black above.....*nigrella*, Lec.

Thorax more or less piceous, elytra testaceous.....*pallida*, Lec.

LACCOBIUS, Er.

L. agilis, Rand., is about .10 in. long, head and thorax blackish, elytra pale, clouded with dusky. Body beneath black, feet pale. It is common near the banks in small ponds.

PRELIMINARY STUDIES IN SIPHONAPTERA.—VI.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus *Hystrichopsylla*, Tschb.

1880. Taschenberg, Die Flohe, p. 83.

This genus has but a single species :—

Hystrichopsylla obtusiceps, Ritsema.

1826. Curtis, Brit. Ent., III., No. 114 (Pulex talpæ).

1831. Macquart, Ann. d. Sci. Nat., XXII., p. 405 (Pulex terrestris).

1868. Ritsema, Tijds. voor Entom., 2 ser. III., p. 173, (Pulex obtusiceps).

1880. Taschenberg, Die Flohe, p. 83 (Hystrichopsylla obtusiceps).

This remarkable flea has a heavier covering of spines and bristles than occurs in any other species. The head combs are on the discs of the cheeks with the spines pointing backward (as in *Typhlopsylla gracilis* and *fraterna*), instead of on the lower edges, there being 10 spines on either side. The first joint of the maxillary palpi is the longest. Pronotal comb with 20 spines on either side. The comb on the first abdominal segment consists of 20 spines on either side; that on the second segment, of 12 on either side, and that on the third segment, of 7 on either side. The tarsi are slender. Colour, chestnut-brown. Length of male, 3.5 mm.; of female, 5–5.5 mm. It has been reported as occurring on *Talpa europæa* and *Arvicola arvalis*, in various parts of Europe.

Genus *Typhlopsylla*, Tschb.

1880. Taschenberg, Die Flohe, p. 86.

TABLE OF SPECIES.*

I. Head with a comb of spines.....*A.*

II. Head without a comb of spines.....*K.*

A. Head not unusually elongated; maxillæ triangular; head comb

* In this table I have followed Taschenberg very closely, as there are many of the species which I have never seen. The characterization of this genus in my second paper will have to be modified somewhat, as two species have come into my hands which are entirely without the head combs so general in the genus, and one in which there are five spines in each head comb.

of 3 to 5 spines on either side; pronotum with a comb, abdomen without any.....*G.*

AA. Head elongated and slender; maxillæ quadrangular; head comb of two thick blunt spines on either side; pronotum with a comb, abdomen usually with one or more; in middle tarsi joint 2 as long as 3 and 4 together; in hind tarsi joint 2 as long as 3 and 4 together, and 3 as long as 5; living on bats.....*B.*

B. Abdomen without combs; pronotal comb of 10 spines on either side; metanotum with 2 very small teeth on either side; tarsal joints all very narrow; in anterior tarsi joint 1 as long as 2 and 3 together, 3 as long as 5 and somewhat more than one-half as long as 2, which is one-third shorter than 1, while 4 is one-half as long as 2; in hind tarsi joint 1 as long as all remaining joints together and as long as tibiæ; length, 3 mm.....*unipectinata.*

BB. Abdomen with one or more comb-bearing segments.....*C.*

C. Abdomen with 1 to 5 comb-bearing segments.....*D.*

CC. Abdomen with 7 comb-bearing segments; first 4 with 9 spines on a side, last 3 with 5 on a side; each segment bearing a single row of bristles; eyes entirely absent; antennal groove in hinder half of head; maxillæ narrow, almost rectangular; joint 1 of maxillary palpi longer than either of last three; pronotal comb of 14 spines on either side; metanotum with 12 short teeth on either side; legs slender and thin, proximal end of first femora with 7 very small teeth; in anterior tarsi joint 4 is the shortest, 2 is as long as 5, but much more slender, 3 about as long as 1; in middle tarsi joint 5 is longer than 2; in posterior tarsi joint 1 is one-third longer than 5, which is as long as 2 and as long as 3 and 4 together; male claspers lamellar and rounded on upper edge; colour, yellowish-brown; length, 2.5–3 mm..*octactenus.*

D. Abdomen with 1 comb-bearing segment.....*F.*

DD. Abdomen with 3 or 5 comb-bearing segments.....*E.*

E. Abdomen with 5 comb-bearing segments; 3 of the abdominal combs with 12 spines on either side; pronotal comb of 12 spines on either side; metanotum with 7 teeth on either side; all other details same as in *octactenus*; length, 2 mm., *hexactenus.*

EE. Abdomen with 3 (the first, second and seventh) comb-bearing segments, each comb with 10 to 12 spines on a side; those on first and second short and thick, on the seventh thin and sharp;

a rudimentary eye barely visible; maxillæ not so rectangular as in *octactenus*, somewhat obliquely cut off below; pronotal comb of 14 to 15 spines; metanotum with 7 teeth on either side; in anterior tarsi joint 1 as long as 5, as long as 2 and as long as 3 and 4 together, 5 is much the thickest; in posterior tarsi joint 1 as long as 2, 3 and 4 together, 2 as long as 3 and 4 together, 5 somewhat shorter; length, 2–3 mm.....*pentactenus.*

F. Abdomen with the seventh segment, only, comb-bearing; length, 2 mm.....*dictenus.*

G. Head comb on anterior edge of antennal groove, the spines pointing straight backward.....*J.*

GG. Head comb in normal position on lower edge of cheeks, the spines pointing downward and backward.....*H.*

H. Pronotal comb of 7 to 9 spines on either side; head comb of usually 3, sometimes 4, spines on either side; with a very rudimentary eye; abdominal segments with 2 dorsal rows of bristles; in middle tarsi joint 1 equals 5; in posterior tarsi joint 1 is one-third longer than 2.....*I.*

HH. Pronotal comb of 11 spines on either side; head comb of 4 spines on either side; maxillæ short triangular; maxillary palpi with joints of nearly equal length; abdominal segments each with one ventral and two dorsal rows of bristles; legs with numerous short spines; in middle tarsi joint 2 is somewhat shorter than 1 and somewhat longer than 5; in posterior tarsi joint 1 is a half longer than 2; colour, yellowish-brown; length, 2 mm.....*musculi.*

I. Pronotal comb of 7 spines on either side; head comb of 3, sometimes 4, spines on either side; maxillæ long and acute; male claspers in the form of two long sugar-loaf plates; colour, pitch-brown; length, 3 mm.....*caucasica.*

II. Pronotal comb of 7 to 9 spines on either side; head comb of 3 spines on either side; male claspers boot-shaped, the sole turned up; colour, dark brown; length, 2.5 mm.....*assimilis.*

J. Head comb of 4 spines; the two upper spines of head comb much longer than the lower; pronotal comb of 9 spines on either side; proportions of tarsal joints as in *caucasica*; male claspers blunt, of the shape of a "ninepin or a cucumber"; colour, light brown; length of male, 2–2 5 mm.; of female, 3 mm.....*gracilis.*

JJ. Head comb of 5 spines; upper spines of head comb of same length as lowest; pronotal comb of 14 spines on either side; male claspers long, edges nearly parallel, slightly broadening towards tips, obliquely cut off at ends; colour, light brown; length of male, 2 mm.; of female, 2.5 mm.....*fraterna*, n. sp.

K. Vertex strongly produced, rounded, face retreating; head with numerous short, very strong, spine-like bristles, all pointing downward and backward; antennæ with numerous bristles on the third joint, arising from the lower third and exceeding the joint, bristles on joint 2 very short; mandibles exceeding the anterior trochanters; pronotal comb of 16 spines; leg spines weak except on the tibiæ and anterior coxæ; on the anterior coxæ they resemble those on the head; hind femora without a row of bristles on the side; in middle tarsi joint 2 equals 5; in hind tarsi joint 1 is longer than 2, 3 and 4 together, while 5 is a half longer than 3; abdominal segments each with one dorsal and one ventral row of bristles, each row with 4 or 5 bristles, those in the ventral rows very strong; claspers of male long, linear, edges parallel, rectangular at the end; colour, reddish-brown; length of male, 1.5 mm.; of female, 2.5 mm..*alpina*, n. sp.

KK. Vertex evenly rounded from occiput to mouth, slightly flattened above in male; head with very few weak bristles; bristles on joint 2 of antennæ longer than third joint, which is without bristles; mandibles attaining three-fourths of anterior coxæ; pronotal comb of 18 to 22 spines; leg spines strong on tibiæ and hind tarsi; hind femora with a row of bristles on the side; in middle tarsi joint 2 is longer than 5; in hind tarsi joint 1 is about as long as 2 and 3 together, while 5 is shorter than 3; abdominal segments each with two dorsal and two ventral rows of numerous bristles, the second dorsal row with 12 to 14 bristles, the ventral rows with nearly as many, ventral bristles not stronger than dorsal; male claspers long, linear, edges not parallel, end somewhat obliquely cut off, rounded; colour, brown; length of male, 2.25 mm.; of female, 3–3.25 mm., *americana*, n. sp.

Typhlopsylla unipectinata, Tschb.

1880. Taschenberg, Die Flohe, p. 91.

Typhlopsylla octactenus, Kol.

1856. Kolenati, Parasit. d. Chirop., p. 31 (Ceratopsyllus octactenus).

Typhlopsylla hexactenus, Kol.

1856. Kolenati, l. c., p. 51 (Ceratopsyllus hexactenus).

Typhlopsylla pentactenus, Kol.

1856. Kolenati, l. c., p. 32 (Ceratopsyllus pentactenus).

Typhlopsylla dictenus, Kol.

1856. Kolenati, l. c., p. 32 (Ceratopsyllus dictenus).

The above five species of Typhlopsylla are all bat fleas, and have been found on a number of kinds of bats in various parts of Europe. I regret to say that I have not been able to obtain any bat fleas from this side of the water.

Typhlopsylla musculi, Duges.

1832. Duges, Ann. d. Sci. Nat. XXVIII., p. 163 (Pulex musculi).

1880. Taschenberg, Die Flohe, p. 92 (Typhlopsylla musculi).

This species has been taken on various mice and rats in Europe. I have seen no fleas from either mice or rats taken in America.

Typhlopsylla caucasica, Tschb.

1840. Motschulsky, Bull. Soc. imp. Moscow, p. 169 (Pulex typhlus).

1880. Taschenberg, Die Flohe, p. 94 (Typhlopsylla caucasica).

"Found by Motschulsky on *Spalax typhlus* in the Caucasian Steppes."

Typhlopsylla assimilis, Tschb.

1880. Taschenberg, Die Flohe, p. 95.

Found in Europe on Sorex vulgaris, Talpa europæa, Mus sylvaticus, and Arvicola arvalis. I have specimens from Lincoln, Nebr., taken on mole (Bruner); from Ames, Iowa, taken on Scolops argentatus (Osborn); and I have found the same species at Lansing, Mich., on the common garden mole. In the male the head above is very slightly concave (as it is in most Pulicidæ), not convex as figured by Taschenberg, nor does the face slope conspicuously downward and backward in either male or female, but meets the cheek margin at little greater than a right angle.

Typhlopsylla gracilis, Tschb.

1880. Taschenberg, Die Flohe, p. 96.

Found in Europe on Talpa europæa and Sorex vulgaris.

Typhlopsylla fraterna, n. sp.

I have collected specimens of this very distinct species at Lansing, Mich., on the common garden mole, and have also received a specimen from Prof. J. M. Aldrich, collected at Brookings, S. D., the host not given.

Typhlopsylla alpina, n. sp.

A very unique flea, collected by Prof. Bruner at Georgetown, Colo., on Mountain Rat. The very conspicuous "bristles" of the head, and anterior coxæ, are short and spine-like, thus differing from those in any other flea I have met with. It is the most well-marked species of the genus.

Typhlopsylla americana, n. sp.

This seems to be a common species, at least west of the Mississippi. I have specimens from Ames, Iowa, taken on Geomys bursarius (Osborn). At Fort Collins I have found it on a large brown mole, and Prof. Gillette has taken it at the same place on the pocket gopher. Prof. Aldrich sent me a specimen taken at Moscow, Idaho, on Thomomys talpoides; it varies from the typical form in having but sixteen spines in the pronotal comb, but is otherwise identical.

(TO BE CONTINUED.)

DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

Cladius (Trichiocampus) gregarius, n. sp.

Allied to *Cladius viminalis*, Fallen. The larval habits are also identical, as seen by Dr. J. A. Lintner's account of *viminalis* in his Fourth Report, p. 44 (as *Aulacomerus lutescens*). The fly, however, is differently coloured; the larva differs but slightly, in that the lateral black spots are larger than the subdorsal ones, whereas in *viminalis* the reverse appears to be the case.

Male.—Basal joint of flagellum of antennæ with a projection on its lower side, the succeeding joints somewhat obliquely set, but simple, all densely pilose; shining black throughout, except the legs, which are pale white outwardly; coxæ, trochanters, base of femora, whole of posterior femora, and all the claws, black. The black colour fades outwardly, becoming almost sordid, luteous, not sharply separated from the white parts. Basal two-thirds of fore wing and nearly the whole of hind wing dark smoky black; the veins and stigma black. Length, 6 mm. Female.—Antennæ simple, the third and fourth joints slightly enlarged at their tips, scarcely pilose at all; coloration as in the male, or the wings rather less smoky; length, 6 mm. There are three submarginal cells, the first obscurely divided near base by an obsolete nervure; lanceolate cell contracted in the middle.

One male and four females bred on *Populus tremuloides* at Keene Valley, N.Y.

Egg.—In slits on both sides of the slender petiole of a leaf, as described by Dr. Lintner for *viminalis*.

First stage.—Head blackish; width, 3 mm. Body all pale, sordid yellowish, warts concolorous, the structure as in the mature larva.

Second stage.—As before. Width of head, .4 mm.

Third stage.—The food shows as a greenish shade. Width of head, .65 mm. The thorax is more yellowish than the abdomen.

Fourth stage.—Head shining black, rounded, mouth rather pointed, the sutures around the mouth pale; width, 1 mm. Abdominal feet present on joints 6–11 and 13, short; thoracic feet just visible from above. Simple, recurved, white hairs, four to five each from low, obscure, concolorous warts, apparently six in two rows above the spiracle on two indistinct annulets, and others more obscure, on the subventral folds. Thorax a little enlarged. Colour yellowish, not shining, the food giving a green tint by transparency, shading to ochreous on thorax and joint 12. A row of little black dots subdorsally (often absent) and a row of large lateral ones, one on each segment. Dorsal vessel dark. Anal plate concolorous with body.

Fifth stage.—Head black or yellow around the clypeus; width, 1.5 mm. Subdorsal and lateral spots large, square, black; anal plate yellow. Otherwise as before. *Cocoon* double; made entirely of soft brownish silk, of the texture of thin paper.

Cladius solitaris, n. sp.

In the absence of a male specimen, I cannot tell to which section of the genus this species is to be referred. The larval characters, however, are very different from those of the preceding species, so that it is probable we have to do with a Cladius proper or with Priophorus, most probably the latter. The fly differs from the description of *isomera*, Harr., *æqualis*, Nort., and *simplicicornis*, Nort.

Female.—Antennæ very minutely pilose, simple. Body shining black, the wings hyaline with black veins; stigma faintly tinged with luteous; the lower inner cell of hind wings does not reach as far as the cell above it, its lower outer angle somewhat pointed. Legs white; the anterior coxæ, middle and posterior coxæ except at tip, the femora

except at base and tip, black; apex of the tibiæ and the tarsi dusky, as also the anterior trochanters, but the middle and posterior trochanters are white. Length, 6 mm.

One female, bred on Alnus.

* * * * * *

Larva.—Third stage.—Sitting flat on the venter, solitary, eating the parenchyma of the leaf from the under side. Head round, shining black, pilose; width, .5 mm. Abdominal feet on joints 6–11 and 13, thorax a little enlarged, abdominal feet slightly spreading. Segments distinct, rather faintly 3-annulate, annulet 1 small, 2 and 3 with many pale setæ, so that the larva is pilose or hairy. Colour translucent whitish, with no yellow tint. The food gives a dark green band by transparency, as far as joint 12. In joint 13 the fæces show black. Thoracic feet faintly yellowish tinged.

Fourth stage.—Head pale whitish, with a black shade at side and vertex; width, .8 mm. Body whitish, with a faint greenish tinge, densely hairy, the tubercles slight. Alimentary canal gives a dark shade.

Fifth stage.—Head greenish, thickly dotted with brown; a confluent black patch on clypeus, over eye and above and behind it; or a patch at vertex and another on side covering the eye and reaching to back of head. Head shining, pilose; mouth brown; width, 1 mm. Dorsal region of body olivaceous blackish; joint 2 anteriorly, sub-ventral region, venter, feet and joint 13 posteriorly, translucent whitish, not shiny; body pilose, the hairs arising from thickly-placed pale tubercles on each of the three annulets. Hairs rather short and pale.

Cocoon double, made of white or brownish silk, large, and resembling thin paper.

Eriocampa fasciata, Norton.

Fly kindly determined by Mr. A. D. MacGillivray.

Fourth stage.— Exactly like the larva of *Monostegia quercus-coccineæ*, Dyar, except that the head and the two posterior pairs of thoracic feet are shining black. Width of head, .55 mm.

Fifth stage.—The same; width of head, .75 mm.

Sixth stage.—Head and thoracic feet whitish honey-yellow; width, .75 mm. Body similar, subtranslucent, no longer shiny, finely annulated; some dorsal watery areas. Sides of thorax bright orange; ocelli black, mouth brown. The larvæ do not eat in this stage, but enter the ground to pupate.

Found on black oak at Plattsburgh, N. Y., and Weehawken, N. J.

In the single specimen bred, the wings are but very faintly smoky.

Blennocampa spirææ, n. sp.

Antennæ as long as head and thorax; third joint about one and one-half times as long as fourth. First recurrent nervure received almost at base of second submarginal cell, second near base of third cell; lanceolate cell petiolate, under wing with no middle cells. Black; tips of femora, all of tibiæ and tarsi, sordid reddish luteous, the claws often smoky; tegulæ black or with the outer half white; two dots behind scutellum, white; wings hyaline, nervures and stigma black, except close to the base, where the nervures are pale. Head and thorax very finely pubescent. Rarely the tibiæ are faintly blackish, especially the anterior pair. Length: ♂, 6 mm.; ♀, 6.5 mm. Four males, five females.

Larva.— Eating the young leaves of *Spiræa salicifolia*, and disappearing before the middle of June; sitting flat on the venter, solitary, but many on a bush. Keene Valley, N. Y. Head pale greenish, not shining, mouth brown, ocellus covered by a black spot; width, 1.2 mm. Abdominal feet on joints 6–12 and 13; thorax a little enlarged, body very slightly flattened ventrally and tapering posteriorly. Several little white pointed elevations, like sharp teeth with two cusps; two of them ad-dorsal on each segment, two sub-dorsal, a single 1-cusped dot laterally anteriorly, three in a triangle stigmatally posteriorly and six on subventral fold. Body pale bluish-green, not shining, closely like the leaf in colour.

Last stage.— Head testaceous, hardly shining, eye black; width, 1.2 mm. Body smooth, 5-annulate, pale yellowish-green, scarcely shining and rather opaque. On acquiring this stage, the larvæ enter the earth. The flies appeared the following April.

Monostegia rosæ, Harris.

Larva.—Head higher than wide, angularly pyriform, widest through the eyes. Pale brown, not shining, eye and mouth black; width, 1.0 mm. Abdominal feet present on joints 6–12 and 13 (22 feet); thoracic feet not large, not seen from dorsal view. Body smooth, subtranslucent yellowish, broadly green dorsally from the food showing by transparency, 6-annulate, not shining, without marks. Under a lens, very slight concolorous pointed elevations represent the tubercles. These are faintly blackish towards the extremities.

Last stage.—Perfectly smooth, pale honey-yellow, almost whitish. The larvæ enter the earth on acquiring this stage without feeding.

Monostegia quercus-albæ, Norton.

My specimens vary in having one or no middle cells on hind wings. The latter is, in fact, the more common, and the specimens appear to be *Caliroa obsoleta* of Norton. The larvæ, as described by me (CAN. ENT., XXVI., 43), differed from Norton's description in having the head black. I have, however, obtained larvæ like those of true *q.-albæ*, and the fly is before me. It was submitted to Mr. MacGillivray, who pronounced it to be *M. q.-coccineæ*, but I can scarcely agree with him, as the wings are hyaline.

Monostegia quercus-coccineæ, Dyar.

Recent specimens vary in having one or two middle cells on the hind wings. Those with two middle cells seem to fit the description of *Eriocampa fasciata*, Nort., and I may be in error in having described the species as new, provided the larval characters prove illusory.

Eriocampa cerasi, Peck.

My specimens vary in having two or one middle cells on hind wings. One specimen has the lower cell present on one side, the upper present on the other with a portion of the cross-vein of the lower.

Larva common on *Cratægus sp.* and on *Amelanchier canadensis* at Woods' Holl, Mass., in July; imago in August. The larva has been often described. It has a final stage (sixth), in which the head does not grow and the larva does not eat, as in the four preceding species. Widths of head: (1) 0.25 mm. (?) [not measured], (2) 0.35 mm., (3), 0.55 mm., (4) 0.8 mm., (5) 1.1 mm., and (6) 1.1 mm.

The following synopsis will separate the larvæ of this group as far as they are known to me :—

Larva not shining, greenish (Rosa).....*Monostegia rosæ.*
Larva shining, slimy.
Larva large, blackish (Pyrus, etc.).....*Eriocampa cerasi.*
Larva smaller, whitish.
Sides of thorax orange tinted (Quercus coccinea).
Head black.....*Eriocampa fasciata.*
Head pale.....*Monostegia q.-coccineæ.*
Sides of thorax concolorous, whitish (Quercus alba).
Head black*.....*Caliroa obsoleta.*
Head pale†.....*Monostegia q.-albæ.*

* *M. q.-albæ*, CAN. ENT., XXVI., 43.

† *M. q.-albæ* of Norton. Fly determined by MacGillivray differently, but I cannot corroborate him.

Harpiphorus tarsatus, Say.

Determined by Mr. MacGillivray as *H. varianus*, but according to Harrington (CAN. ENT., XXV., 59) this name indicates only a variety.

Egg traces below the lower epidermis, but apparently sawed through from the upper side; elliptical patches, well separated, in straight rows parallel to a vein or transverse or irregularly distributed; many on a leaf; size, .8 x 1.2 mm.

First stage.—Head faintly brownish, eye black; width, .4 mm. Body whitish, rather opaque, annulate, not shiny, the food showing distinctly; sub-ventral fold prominent in the centre of each segment; feet on joint 6–12 and 13.

The larvæ sit all in a mass on the back of the leaf, flat on the venter, and eat the parenchyma from below.

Second stage.—The same. Width of head, .55 mm. Later the larvæ rest curled spirally and become covered with a white woolly coating.

Third stage.—Head, .65 mm. No change in colour.

Fourth stage.—Head, .8 mm.

Fifth stage.—Head, 1.1 mm.

Sixth stage.—Head, 1.5 mm.

Seventh stage.—The larvæ rest flat on the back of the leaf, curled, the anal end inside of the spiral and slightly lifted.

Head round, full at the vertex, highest centrally, clypeal sutures well-marked; smooth, black, covered with a white mealy substance nearly obscuring the surface; palpi, an area around the mouth and the distinct antennæ, pale yellowish; ocellus black; width, 1.8 mm. Thoracic feet rather small with black hooks; abdominal ones on joints 6–12, 13, large. Segments rather coarsely 6-annulate, the intersegmental incisures scarcely more distinct; sub-ventral fold well-developed, undulate. Nearly opaque honey-yellow, all the dorsal region to sub-ventral ridge covered with a mealy white secretion, partly or wholly obscuring the surface, or even growing out into filmy threads nearly 1 mm. long. Anal plate small, rounded-quadrate, black.

The white secretion is formed afresh after each moult.

[TO BE CONTINUED.]

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PROFESSOR WILLIAM SAUNDERS, F.R.S.C., F.L.S.

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PROFESSOR WILLIAM SAUNDERS, F. R. S. C., F. L. S., ETC.

We take great pleasure in presenting this month a likeness of Prof. Saunders, who must be well-known, if not personally, certainly by reputation, to every reader of the CANADIAN ENTOMOLOGIST. He was one of the founders of the Entomological Society of Ontario in 1863, and became its President in 1875, which position he held continuously till he was appointed Director of the Experimental Farms of the Dominion in 1886. From 1874 to 1886 he was the General Editor of this Magazine, and conducted it with singular ability and success. In 1883 he published his great work: "Insects Injurious to Fruits," which has become a standard volume of reference among horticulturists and economic entomologists, and which reached a second edition in 1892. The list of his publications in the Bibliography of the Royal Society of Canada covers several pages and numbers between two and three hundred. In the words of an American writer: "by painstaking study and observation he has risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist."

No one can be more highly esteemed by all who know him, or more beloved by his friends, than PROFESSOR WILLIAM SAUNDERS. May he long be spared in health and strength to carry on his arduous and important work for the benefit of the people of this Dominion!

OCCUPANTS OF THE GALLS OF EUROSTA SOLIDAGINIS, FITCH.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

These conspicuous spherical galls occur somewhat rarely at Ottawa upon the stems of *Solidago rugosa*, and have been found to yield only the handsome fly which produces them, and its parasite *Eurytoma gigantea*, Walsh. The 24th May last I spent at Casselman, about thirty miles southward from Ottawa, with Mr. Fletcher, and we found the galls abundant upon *Solidago serotina*, upon the banks of the South Nation. On opening one I found a pupa, apparently of a Mordella, in the pithy substance, and, remembering Mr. Brodie's very interesting paper (CAN.

ENT., Vol. XXIV. p. 137) upon the occupants of similar galls from Manitoba, I afterwards collected a pocketful. They were very much larger than those which are found at Ottawa, and perhaps scarcely so spherical. Many were evidently already vacated by the producing flies, but I hoped that they might still have other tenants. About a week later, as only three flies had emerged, I opened about half of them, and was rewarded by finding several inhabitants. The majority of the galls contained in the central cavity the empty puparium of the fly, but in several the larva of the fly had apparently not hatched or had soon after perished, as there was no cavity. In only one gall was found the pupa of *Eurytoma gigantea*, and in this cavity there was no puparium of the fly. In winding tunnels in the pithy substance of other galls were found a Mordellid larva and pupa, which were placed in alcohol, and a few small Chalcidid pupæ, one of which was evidently a smaller species of Eurytoma. Several dead larvæ of the beetles were also found in their burrows. On June 21st, as nothing had since emerged, I opened the remaining galls, and in two I found living examples of *Mordellistena nigricans*, Melsh. In each instance the central cavity of the gall contained the empty puparium of the Eurosta, which had escaped by its own exit, while the beetle was at the end of a long burrow through the solid pithy substance, and just cutting its way out. It is evident, therefore, that Mr. Brodie was mistaken in announcing this beetle as a true parasite of the fly, and as "bred from an Eurosta pupa-case." It is certainly only an inquiline, the larvæ boring in and living upon the pithy substance of the gall. Some years previously (CAN. ENT., Vol. XIII., p. 173) the late Mr. V. T. Chambers had recorded a Mordella larva (perhaps this same species) as "common in the galls of *Gelechia gallæ-solidaginis*, Riley, in stems of Solidago, eating into and through the walls of the galls, but not disturbing the larvæ or pupæ of the moth." Besides the two beetles, there were found in the galls, in the small burrows made by the beetle larvæ, three or four more of the chalcidid pupæ and two flimsy braconid cocoons, from which emerged specimens of Sigalphus, answering very well to the description of *S. texanus*, Cress. The small Eurytoma proved apparently to be *E. studiosa*, Say, while the remaining seven pupæ developed into a species of chalcidid which I have not been able to determine. The latter species, the *E. studiosa*, and the Sigalphus are evidently parasites, not of the gall producing Eurosta, but of the inquilinous Mordellistena. We have, therefore, from these few galls examples of the fly which produces it, a true parasite thereon, an inquilinous beetle, and three parasites thereof.

NEW NORTH AMERICAN MYCETOPHILIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Platyura lurida, n. sp. ♀. Head and antennæ black, first two joints of the latter and the mouth parts somewhat yellowish. Thorax, pleura, scutellum, abdomen and legs, pale yellow, the tarsi toward the apex brownish-yellow, the thorax marked with three reddish-yellow vittæ. Wings hyaline, slightly tinged with yellowish toward the costa, otherwise unmarked; tip of auxiliary vein nearly twice the length of the humeral cross-vein beyond the base of the third; sub-costal cross-vein nearly three times the length of the humeral beyond the latter; anterior branch of the third vein oblique, ending its own length beyond the tip of the first; sixth vein reaches the wing margin. Length, 6 mm. Washington. A single specimen from Prof. O. B. Johnson.

Platyura Maudæ, n. sp. ♀. Head and antennæ black, palpi yellowish. Thorax, pleura and scutellum bluish-black. Abdomen reddish-yellow, first two segments black, the base of the second tinged with reddish; this segment is one-half longer than broad. Halteres yellowish. Coxæ reddish-yellow, blackened at their bases, femora deep yellow, tibia brownish-yellow, tarsi black. Wings yellowish-gray, a brownish spot extends from the first vein, before its apex, to the posterior branch of the fourth vein near its base; apex of wing from midway between tips of first and third veins to apex of sixth vein grayish-brown; a brown cloud on third vein near its base; tip of auxiliary vein twice the length of the humeral cross-vein beyond the base of the third; sub-costal cross-vein one and one-half times the length of the humeral cross-vein beyond the latter; anterior branch of third vein oblique, ending nearly its own length before the tip of the first; sixth vein reaches the wing margin. ♂ same as the ♀ except that the second abdominal segment is twice as long as broad, and the anterior branch of the third vein is perpendicular, ending twice its length before the tip of the first vein. Length, 9 mm. Washington. A pair from Prof. O. B. Johnson, at whose suggestion I have named this handsome species in honour of Miss Maud L. Parker, whom he designates as "one of my most faithful collectors."

Platyura pectoralis, n. sp. ♀. Front, occiput and antennæ, black; first two joints of the latter, the face, cheeks and mouth parts, yellowish. Thorax and scutellum reddish-yellow, pleura and metanotum bluish-black. Abdomen reddish-yellow, the first segment black, the second three times as long as broad. Halteres yellowish. Coxæ and femora reddish-

yellow, tibiæ brownish-yellow, tarsi black. Wings yellowish-gray; a brown spot extends from costa before tip of first vein to posterior branch of fourth vein near its base; apex of wing from midway between tips of first and third veins to apex of sixth vein, grayish-brown; a brown cloud on the third vein near its base; tip of auxiliary vein opposite base of the third; sub-costal cross-vein one and one-half times the length of the humeral beyond the latter; anterior branch of third vein oblique, ending twice its length before the tip of the first vein; sixth vein reaches the wing margin. Length, 12 mm. Nevada. A single specimen from the late Mr. Morrison.

Platyura fasciola, Coq. Described as a Ceroplatus, but is best located in the present genus.

Mycetophila Hopkinsii, n. sp. ♂. Black, the thorax and abdomen sub-shining, not pollinose; the halteres, femora, tibiæ and base of metatarsi dusky yellow. Antennæ twice as long as the head and thorax united, densely short, whitish pubescent. Thorax and scutellum sparse, coarse, golden-yellow pilose; abdomen fine yellowish-white pilose. Front tibiæ destitute of stout bristles except at the tip, the middle and hind ones bearing numerous black bristles. Wings gray, unmarked; auxiliary vein entire, ending in the costa slightly beyond the base of the third; fourth vein forks the length of the small cross-vein beyond the latter; fifth vein forks opposite the lower end of the oblique small cross-vein; sixth vein scarcely reaching beyond the middle of the posterior fork of the fifth; costal vein reaches the first third of distance between tips of third vein and anterior branch of the fourth. Length, 4 mm. Morgantown, W. Va. A single specimen from Prof. A. D. Hopkins, after whom the species is named.

Dynatosoma fulvida, n. sp. ♀. Yellow, the antennæ and apices of tarsi black, tibiæ tinged with brown; an indistinct brownish fascia extends from one ocellus to the other, or the entire front and occiput are sometimes black. Wings yellowish-gray; a brown spot extends from costa to base of posterior branch of fourth vein; apex of wing from before tip of first vein to apex of posterior branch of fifth vein, brownish, enclosing a sub-hyaline spot that extends from the third vein to the middle of the third posterior cell; tip of auxiliary vein three times the length of the humeral cross-vein beyond the latter, ending in the first vein; sixth vein not nearly reaching the wing margin. Middle and hind tibiæ each bearing

outwardly three rows of stout bristles, and on the inner side with a row of smaller ones. Length, 7 mm. Washington. Two specimens from Prof. O. B. Johnson.

This is the first discovery of the present genus in this country. It is closely related to Mycetophila, differing principally in the course of the auxiliary vein, which terminates in the first, instead of being abbreviated, or of ending in the costa.

ON THE SUBGLOBULAR SPECIES OF LECANIUM.

BY T. D. A. COCKERELL, NEW MEXICO AGRICULTURAL EXPERIMENT STATION.

The genus *Kermes* of modern authors contains about a dozen subglobular forms, found on oaks, with one exception. These insects might be taken for species of *Lecanium*, but a microscopical examination of their characters, especially in the larva, shows that they are quite distinct from that genus.

There are, however, four known subglobular species which structurally and in the larva resemble *Lecanium* and not *Kermes;* adding to these four others which I have lately received, we have altogether eight subglobular coccidæ which show true *Lecanium* characters.

Two of these live on conifers, and are placed in a genus separated from *Lecanium*, known as *Physokermes*. *P. abietis* (mod.) = *hemicryphus*, Dalm., = *racemosum*, Ratz., = *piceæ*, Schr., inhabits Europe; *P.* n. sp. (shortly to be published) lives in Colorado.

In Europe is also found *Lecanium emerici*, Planchon, on *Quercus ilex* and *Q. coccifera*. This I have never seen, but Signoret gives its characters in some detail. The dermis is tessellate, as in *Physokermes*.

From Montevideo comes a very large species, *L. verrucosum*, Signoret, and below I describe three from Brazil.

Finally, in Australia is *L. baccatum*, Maskell. None of these last five have the dermis tessellate.

Summing up, we thus have: (1) A distinct genus of two species, one Palæarctic, one Nearctic, confined to conifers. (2) A single Palæarctic species, on oaks. (3) Four Neotropical species; and (4) One Australian.

It seems probable that these insects represent old types, not late developments from normal *Lecanium*. But *L. emerici* and *Physokermes*

seem somewhat related to the *Eulecanium* series, which inhabits the Palæarctic and Nearctic regions, and is entirely absent (except where introduced on cultivated plants) in the Neotropical and Australian. Now that the Neotropical series is increased to four, we can see (1) that it is diversified within its own limits, doubtless actually more numerous in species than present information shows, and probably, therefore, endemic; (2) that it more resembles the Australian species than those of the Palæarctic or Nearctic regions.

Thus the indications are, that the Palæarctic-Nearctic series of subglobular forms is altogether distinct from the Neotropical-Australian series, the resemblance being much closer superficially than in structural characters. The last-mentioned series does, however, seem to hold naturally together, and its distribution may, perhaps, be used as an argument by those who favour the hypothesis of land-connection between S. America and Australia.

The three new Neotropical species were all collected by Dr. Von Ihering, the well-known naturalist, now of the Sao Paulo Museum.

Lecanium pseudosemen, sp. nov.

♀. Scale globose, max. diam., about 10 mm., a moderate-sized specimen is long. 8¼, lat. 7¼, alt. 7 mm. Scale clasping twig; leaving, when removed, four small, broad stripes of white secretion. Colour coffee-brown, or reddish-brown, sometimes irregularly marked with yellowish; surface smooth, fairly shiny. Under a lens appears minutely tuberculose and finely and closely spotted with yellowish.

Boiled in caustic soda, it stains the liquid madder-brown, the pigment precipitating on standing.

Dermis (transmitted light) not tessellated; shows large, oval gland-pores.

Claw rather short, stout, curved, sharply pointed. Digitules of claw extending beyond its tip, rather slender, but with large knobs. Tarsal digitules only moderately long, slender, with small knobs. Tarsus somewhat arched; tibia also somewhat arched, but in a contrary (forward) direction; both slender, tibia about ¼ longer than tarsus. Femur about as long as tibia, moderately stout. Trochanter with a very long hair at its end.

Antennæ 8-jointed; 1 unusually large and long, much longer than its breadth at apex, but hardly so long as its breadth at base; 2 about as long as 1, and about half as broad as long; 3 distinctly longer than 2, but not much longer; the rest are all shorter; 4 next longest, then 5 and 8, then 6, then 7. Formula 3 (12) 4 (58) 67; 1 and 2 each with two hairs near apex; 3 with a hair not far from base.

Hab., Brazil, presumably S. Paulo, on twig of plant not determined (*Von Ihering*, No. 59). ♀. Scales sent, containing embryonic larvæ.

The dermis shows numerous moss-like ramifying bodies, presumably some parasitic alga. These growths are very much like the dendritic crystals of black oxide of manganese sometimes seen on slabs of limestone rock, but they are granular and frequently pigmented dark brown.

The scales look like large seeds or berries. Although a large species, this is by no means so large as *verrucosum*, from which it differs in several characters.

Lecanium monile, sp. nov.

♀. Scale on bark, long. 4, lat. 3½, alt. about 2½ mm., rounded, sub-globose, moderately shiny, reddish-brown, irregularly mottled. Posterior cleft distinct.

Dermis not reticulate; with rather few small round gland-pores, but also with, at moderate intervals, *large oval or sub-circular reticulated patches*. This last is a very peculiar feature. No legs or antennæ found in adult.

Larvæ present in the scales; these embryonic larvæ have 6-jointed antennæ; 3 longest, 6 nearly as long; 1, 2, 4, 5 subequal. They also show very long and slender tarsal digitules; digitules of claw not alike, one filiform, the other moderately stout.

Hab., Sao Paulo, Brazil, on plant not identified (*Von Ihering*, No. 52). Several of the scales show large parasite-holes; these, especially, look like small brown beads, the hole looking like that for the string.

Pseudokermes, subg. nov.

♀. Lecaniid, but the appearance suggesting a small *Kermes*; covered with a thin, glassy scale, much after the manner of *Inglisia*; antennæ and legs absent in adult; dermis not chitinous.

Lecanium (Pseudokermes) nitens, sp. nov.

♀. Scale smooth, ochreous, very shiny, sub-globose, divided

antero-posteriorly by a shallow groove; long. 2½, alt. 2, lat. 3 mm. Glassy scale very thin, white and semi-transparent, forming sublateral low cones, concentrically but not longitudinally striate.

Dermis (after boiling) colourless, not tessellated; a marginal row of small, short spines and round gland-orifices. No vestige of legs or antennæ could be seen, although the specimens were easy to examine for such characters by reason of the transparent dermis.

Mouth parts distinct and well-developed, mentum apparently monomerous, broad, with a pair of small bristles on each side near the tip. Rostral filaments short.

Anogenital ring with several hairs. Anal plates small, their external sides meeting at about a right angle; the anterior-external side decidedly longer than the posterior-external. Immediately cephalad of the plates, and partly surrounding them, is a broad brown chitinous crescent; its breadth in the middle rather greater than the length of the plates.

Hab., on *Myrtus (Blepharocalyx) tweedii*; Rio Grande do Sul, Brazil (*Von Ihering*, No. 45). I presume it infests the twigs, but the specimens sent were detached and in alcohol. The glassy covering is very fragile, and in every specimen was broken; in several altogether lost.

This remarkable coccid should form the type of a new genus, but is now placed in a sub-genus of *Lecanium* as a matter of convenience and to indicate its relationships. At first sight one would take it for a highly specialized form, the end of the branch of subglobose neotropical species. But it shows curious resemblances to several genera and species, and for this reason might be thought a primitive type.

The arrangement of the anogenital structures seems rather like that of *L. baccatum*, but that is believed to have a hairless anogenital ring.

The broadened form, with median groove, and the lack of legs in the adult, strongly suggest *Physokermes*. The derm, however, is not tessellate.

The glassy covering recalls at once *Inglisia*, but it does not show the "air-cells" of that genus. The way in which the glassy covering is formed suggests *Fairmairia*.

ON THE CABBAGE-SHAPED GALL OF CECIDOMYIA SALICIS-BRASSICOIDES, AND ITS OCCUPANTS.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEXAS.

On July 9, 1892, I found in the Grand Canon, Arizona, on the Hance trail, near the Colorado River, numbers of the green galls of this species on the narrow-leafed *Salix* sp. (probably *S. longifolia*). Three that were picked on this date measure 19 to 20 mm. in length, and 11 mm. in width on widest portion near base. They preserve their light green colour, except for their whitish, thick pubescence. Some last year's galls were also found in the canon on the willows near the stone cabin. They measure 16 to 17 mm. in length, and 10 to 11 mm. in width. They are more spread out apically; therefore not conical in outline, and are reddish-brown in colour, probably from being weathered.

Three galls of this species, from West Cliff, Colorado, sent me by Mr. T. D. A. Cockerell, measure only 13 to 14 mm. in length, by 8 to 9½ mm. in greatest width, near base. They are well cone-shaped, but reddish-brown in colour save for the grayish external pubescence. These are mentioned by Mr. Cockerell in *Entom.*, 1890, p. 280.

Green galls of this cecid were found near Las Cruces, August 21, 1892, in great numbers on *Salix longifolia* along the *acequia madre* in the Alameda. They were little more than one-half inch long at this date, and were borne in numerous dense clusters of a dozen or more each. On Nov. 13 and 14, 1892, over 200 of these galls were picked from the willows in the above locality. Many of the clusters were on twigs that had died, showing that the galls kill the new growth to a considerable extent. Some were found on topmost twigs of the willow 10 feet high, while others were within 3 or 4 feet of the ground and frequently in masses. One thick bunch contained 21 galls. Eight of the smaller sizes and seven of the larger, selected from these 200 galls, measure as follows:—

	LENGTH.		WIDTH.	
Smaller Galls.	6	by	6	mm.
	7	"	5½	"
	7	"	6	"
	7	"	6½	"
	9	"	6½	"
	12	"	9	"
	13	"	8½	"
	14	"	7	"

	LENGTH.		WIDTH.	
Larger Galls.	15	by	10	mm.
	17	"	11	"
	18	"	10	"
	18	"	11	"
	19	"	9	"
	20	"	10	"
	22	"	10½	"

The above include the smallest and largest. The smallest are not fully developed, and lack the tapering tip; while the longest depend for their length on this tip being well elongated, since it will be seen that the width of the larger ones is more nearly equal. The smaller galls, while varying in length 8 mm., vary in width 3½ mm. But the larger ones, while varying in length 7 mm., vary in width only 2 mm.

Of these 200 galls, thirteen were opened on Nov. 13, the same day collected. Six contained the plump, perfectly white larva; while the other seven contained smaller light brown, elongate puparia enclosing a transformed hymenopterous parasite alive and ready to emerge. One of the parasites which was pulled from its puparium moved its legs and showed signs of life. The galls containing these hymenopterous puparia were the most dried ones in appearance, and were on dead branches. This parasite seems to remain transformed within its puparium in the centre of the galls all winter, issuing in the early spring. Specimens were bred and identified by Mr. Ashmead as *Platygaster obscuripennis*, Ashm. On March 16, 1893, four of the cecids were found issued and dead; while there was a number of the parasites issued, and only one or two of these dead, most of them being very active and one pair in coitu. Up to March 24, 1893, one more cecid had issued, making five cecids in all; while of the parasites ten had issued. In issuing, the cecids sometimes, if not frequently, leave their pupa-skins sticking by the abdominal portion in the tip of the cone-like gall. On April 9, 1893, 30 more cecids were found issued and dead, 2 more alive, and 2 blackish pupæ issued from galls. Not a single parasite had issued since March 24, but a live one appeared April 9.

The following are descriptions of the occupants of this gall:—Larva of *Cecidomyia salicis-brassicoides*.—Length, 2 3-5 to 3½ mm.; width, 1 3-5 to 2 mm. Colour perfectly pure white originally, changed by immersion in alcohol to rosy or pale orange. Oblong-oval in form, plump, fleshy, apodous, consisting of 13 segments. Head rather sunken and retracted within anterior end of body, little more than one-third width of next segment; latter hardly more than one-half width of third segment, which in turn is considerably narrower than fourth, and the fourth is narrower than fifth. These segments are all about the same length so far as length is appreciable in their partially retracted condition. Segments 6 to 8 are very slightly wider than 5, nearly equal in width,

segment 7 being the widest portion of body. Segments 6 to 10 are nearly equal in length and much longer than segment 5, but segments 7 and 8 are equal and slightly the longest in the body. Segments 9 to 11 are gradually narrowed and successively slightly shortened, 12 and 13 being much more narrowed and more or less retracted within posterior end of body. Whole integument bare, with a minutely rugose-appearing surface. Anal segment with a perpendicular median wrinkle on lower half; twelfth segment bearing above on posterior margin a pair of minute short horn-like prolongations of the integument, projecting transversely inward towards each other, the tip of each pale brownish. Mouth parts appearing as a pale brownish spot in centre of capital segment, with a minute brownish dot on each side at edge of it. Breastbone pale brownish, nearly as wide as long, or narrowed on basal half or more, with a pair of 2-jointed palpus-like organs on terminal portion, the tip of each minutely darker at the suture dividing the two joints, the basal joint stout and rather elongate subconical, the terminal joint minute and very short conical.

Described from six specimens, taken from galls on November 13th.

Puparium of *Platygaster obscuripennis*, Ashm. (containing transformed adult).—Length, 2 3-5 to 2 4-5 mm.; width posteriorly, 1 to 1 1-5 mm.; width anteriorly, about 3-5 mm. Colour light yellowish-brown, appearing dark brown where the adult shows within. Subcylindrical, gradually narrowed and subtruncate anteriorly, rounded oval posteriorly. Surface of whole integument minutely punctured. Circular surface of plate of anterior subtruncate end somewhat wrinkled and roughened, with a small central lighter-coloured tubercle, and with an organ on lower edge of plate forming part of integument and bearing a striking resemblance to the breastbone of the cecid, but probably representing the mouth parts of the hymenopterous larva.

Described from four specimens taken from galls, Nov. 13.

Adult of *P. obscuripennis*.—Length, 1 4-5 to 2 2-5 mm. Wholly shining black, legs pale brownish except most of femora and sometimes part of tibiæ black. Wings nearly transparent, very faintly smoky, reaching beyond abdomen, thickly and minutely short hairy.

Mr. Ashmead also identified a second parasite bred from this cecid as *Decatoma* sp.

DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, A. M. NEW YORK.

(Continued from page 196.)

Eighth stage.—Head shining black, yellowish punctured around the mouth, antennæ yellowish; eye and jaws black; width, 1.8 mm. Body ochreous yellow, 6-annulate with irregular quadrate sub-dorsal (two per segment) and lateral (one per segment) black spots, confluent on joint 13; sub-ventral ridge faintly discoloured; anal plate blackish. No white secretion. The larvæ do not feed in this stage, but seek for soft wood in which they bore their galleries for pupation.

Eight stages is probably the least number which these larvæ have. I have found them with the following widths of head:—2.2 mm., 2.45 mm, 2.9 mm. This indicates that they may have as many as eleven stages, perhaps in the case of large females.

Acordulecera dorsalis, Say.

Determined by Mr. MacGillivray.

Only on the very young leaves of the black oak, eating the whole leaf down irregularly. Sitting flat on the venter, but holding on by the thoracic feet, and flap up the abdominal portion when disturbed. Feet on joints 6–11, 13, but very small, nearly aborted, none of them used; thoracic feet large. Body smooth, stiff as if inflated, shining colourless, the food showing green. Segments marked into 4 annulets by creases, not incised. Sub-ventral fold prominent, in the centre of the segment, giving the outline a fluted appearance. Tracheæ very evident. Head colourless, tinged with blackish, or with brownish in the last growing stage (width, .8 mm.), especially below; a little fine pile; eye black, mouth brown.

Last stage.—The larvæ moult and enter the ground; colour faintly bluish, less transparent and with distinct blackish dots in three transverse rows per segment. Head grayish-tinted; width, .8 mm. Body smooth, a little shiny, sub-ventral folds scarcely prominent.

Hylotoma McLeayi, Leach.

I was much surprised to find that the larvæ which produced flies of this species were totally different from those described by Norton (Trans. Am. Ent. Soc., IV., 78, 1872).*

*I have seen the larvæ which he describes, but their structure and position are like those of the species of Emphytus which I have bred. My larvæ died.

Larvæ abundant on wild cherry (*Prunus serotina*) at Woods' Holl, Mass., often gregarious, sitting on the edge of the leaf, the body held down close to it. The abdominal feet, though small, are used.

Eggs.—Laid is a series of saw-cuts along the edge of the leaf between the upper and lower epidermis, the series often extending from the middle to apex of the leaf. Incisions nearly circular, open on the edge, slightly swollen; 1.2 mm. in diameter.

There appear to be eight larval stages, but I have not observed the early ones.

Fourth stage.—About as in the next stage, but smaller and the tubercles quite indistinct except sub-ventrally, owing to their small size and pale colour. They hardly appear more than blackish spots. Colour pale, more of a honey-yellow than the mature larva, a greenish shade from the alimentary canal. Width of head, 1.1 mm.

Fifth stage.—Head shining brownish-black without depressions; width, 1.4 mm. Tubercles greenish-black, less distinct than finally. Joints 2 and 12 appear yellow, as the green shade from the alimentary canal is interrupted there.

Sixth stage.—Width of head, 1.75 mm. There is very little change; the tubercles gradually become larger and darker coloured.

Seventh stage.—Width of head of ♂, 1.75 mm.; of ♀, 2.2 mm. Much as in the next stage.

Eighth stage.—Head full at vertex, evenly rounded, sutures obscure; smooth, shining black with four dents in front; ocellus depressed; width: ♂, 1.75 mm.; ♀, 2.2 mm. Body large, full, with sub-ventral folded ridge. Thoracic feet large and strong, abdominal ones small, present on joints 6 to 11 and 13 with a very rudimentary pair on joint 12. Segments obscurely 3-annulate. Body orange-yellow or yellow, with a diffuse greenish shade from the alimentary canal. Thoracic feet except at joints, abdominal feet outwardly, suranal plate and the rather large (0.2 mm. diameter), round, minutely setiferous tubercles, shining black. The tubercles are low, rounded, smooth, each with a central, short, black seta. They are arranged in three rows on each segment, nine on each side in a square above the sub-ventral fold, with one or two little ones just posterior to the spiracle; on sub-ventral ridge a single elongate, slightly oblique one, bearing six or more setæ; three in the anterior row ventrally, but only one in the two posterior rows. The arrangement is somewhat modi-

fied at the extremities. Spiracles black. At the end of this stage the larvæ empty their intestinal canals and spin cocoons on the surface of the ground without moulting.

Cocoon entirely of yellow silk, double, the outer layer of coarse meshes, the inner thinner and more compact. Larvæ in July; the flies emerged the following April. In the last moult there is no increase in the size of the head, but the larvæ feed in the last stage. The ♂ larvæ are smaller than the ♀, and their heads do not enlarge at the moult before the last, so they possess the anomalous character of having three stages without any growth of the head. I have never observed anything of this kind in the Lepidoptera, perhaps owing to their very different manner of moulting. In the saw-flies the old head is split at each moult, as in the Lepidoptera at pupation only, and the new one has to grow after the moulting instead of largely before it, as in the Lepidoptera.

Hylotoma pectoralis, Leach. The red-headed birch saw-fly.

A general description of this larva has been given by Rev. T. W. Fyles (CAN. ENT., XVIII., 38). I have a few details to add.

Found on the black birch *(Betula lenta)* at Woods' Holl, Mass, and Plattsburgh, N. Y.; also common on the white birch *(Betula papyrifera)* at Keene Valley, N. Y.

Eggs.—Laid in a series of saw-cuts along the edge of the leaf between the upper and lower epidermis, producing slight swellings 1.5 mm. in diameter. The eggs are soft and white.

The number of larval stages was not exactly determined, but what evidence I have leads me to believe that there are eight, and I shall describe them on that basis.

First stage.—Head reddish; width .6 mm. Body essentially as in the next stage (Keene Valley).

Second stage.—Head shining black, a little paler at sutures, round, about as high as wide, dented at clypeus; width, about .7 mm. Thoracic feet black, except at the joints. Body as in the next stage, but the piliferous dots much smaller and so less distinct (Woods' Holl).

Third stage.—Head light reddish-brown, shining, clypeus slightly indented in black; eye black in a black spot; head well rounded, rather higher than wide, full at vertex; width, .9 mm. Thoracic feet large, largely black; abdominal feet small, their bases black and corresponding spots on the apodal segments. Body shining yellowish-green, alimentary canal obscured; segments hardly annulate, but with three rows of large

black spots (three per segment), besides the oblique black mark on sub-ventral ridge and minute ventral dots anterior to the legs; all bear short, stiff, black setæ.

* * * * *

Fifth stage.—Head clear light orange-red, shining, minutely sparsely black pilose; eye on black spot; width, 1.4 mm. Abdominal feet on joints 6–10 and 13, small with indications of feet also on joints 11 and 12; thoracic ones pale with slight black marks. Body as before; anal plate black.

Sixth stage.—Head well rounded, full at vertex, but narrowing to a central apex; sutures obsolete, but four dents in front indicate clypeus; shining light red with a few black setæ; eye black; width, 1.8 mm. Body cylindrical, of nearly even width to joint 13, which is a little smaller; abdominal feet, corresponding spots on the apodal segments and anal plate black; no cervical shield: thoracic feet pale brownish. Segments not annulate, shining green, yellowish laterally; nine large elevated rounded black spots, .2 mm. in diameter, in a square on each side above the stigmatal line on each segment, one below posteriorly to the spiracle, and several small ones on the conspicuous, obliquely divided sub-ventral ridge; a small black patch at base of abdominal feet 7–10 and minute ventral spots. Anal feet pale orange. A series of round medio-ventral orange spots, almost between the feet on joints 7–12.

Seventh stage.—Width of head, 2.2 mm. (1.8 mm. in male?). Much as before throughout, but the black spots are larger (.25 mm.), shining blue-black.*

* * * * *

Cocoon.—Double, open reticular, of yellow silk, the outer layer of large meshes; spun at the surface of the ground.

Lophyrus Lecontei, Fitch.

Gregarious, eating down the needles of the pine. When disturbed, the larvæ raise the thoracic feet and eject a white fluid from their mouths.

Head light red, eye and mouth black; width: ♂, 1.8 mm.; ♀, 2.2 mm. Thoracic feet rather small, black except at the joints. Abdominal feet present on joints 6–12 and 13 (22 feet), all well-developed. Body rather greenish-white, nearly opaque, slightly shining; segments not very distinctly 4-annulate, with rows of microscopic black spinules on the

* The eighth stage was not noted. It probably escaped observation, as there should be no increase in size of the head, and I neglected to isolate one larva.

first, second and fourth annulets. A series of sub-dorsal, sooty black patches, tapering posteriorly, varying in different individuals. The two rows approach each other posteriorly, and on joint 13 form a single, large, quadrate patch anterior to the pale suranal rim; spots partially broken between the annulets. A similar lateral row of sub-quadrate spots; a smaller one on sub-ventral ridge, and a small spot above base of each abdominal foot, except toward the extremities of the body. Venter immaculate.

At maturity the larvæ moult, leave the trees and form their reddish-brown cocoons at the surface of the ground. Head shining sordid white with a blackish shade all over the vertex and part way down the sides, not on the clypeus; sutures evident, eye in a black spot; mouth red; width as before. Body sordid white, 6-annulate, slightly shining; alimentary canal empty. Black spots as before, but not sooty, slightly shining and minutely white-dotted. Thoracic feet slightly blackish or wholly watery-whitish.

Found on *Pinus rigida* and *P. Banksiana* at Woods' Holl, Mass., in August. Flies emerged the following spring. This was determined by Mr. MacGillivray as *Lophyrus Lecontei (?);* but as the larva corresponds with Riley's description, I have left off the mark of doubt.

Imago.—♂. Shining black, a ventral band and tip of abdomen rufous; all the femora, tibiæ and tarsi rufous, the anterior legs palest. Veins and stigma pale brownish; hind wings smoky outwardly; antennæ 21-jointed.

♀. Reddish; sides of thorax above wings and abdomen, except at tip, black; a black shade below sub-ventrally, especially on abdomen and on anterior femora; antennæ black, 21-jointed. Cross-nervure of lanceolate cell hardly oblique.

The following synopsis will separate the larvæ of Lophyrus at present described in works to which I have access :—

Larva without spots; head black (Abies)..... *Lophyrus abietis.*

Larva with angular black spots.

Head black, no sub-ventral spots (Pinus strobus)..... *Lophyrus Abbotii.*

Head red; small sub-ventral black spots (Pinus rigida, etc)..... *Lophyrus Lecontei.*

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XII. The Hydrophilidæ of Ontario and Quebec (concluded).

This paper can scarcely be considered in any sense an original one, since it consists almost entirely of tables published in greater detail by Dr. Horn in his reviews of this portion of the Hydrophilidæ. By removing the extra-limital forms, I have been able in some cases to modify the synopses so as to make them a little easier to follow, and it is hoped that they will prove of use to many students of the Canadian fauna who may not see the more complete originals. With this prelude, which will place the credit where it properly belongs, we may proceed.

Philhydrus, Sol.

With this genus commences a series of less convex and usually shining black species, which are common along the edges of ponds and creeks, rising to the surface, after the manner of the Helophori, when the water is agitated. Some of them resemble each other very closely, but may be thus distinguished :

A. Above paler, testaceous to pale piceous.
  b. Prosternum distinctly carinate (.14–.18 in.) . . . *nebulosus*, Say.
  bb. Prosternum not carinate.
    c. Mesosternal lamina very feeble, the anterior edge without distinct angle (.14–.16 in.) . . . . . *ochraceus*, Mels.
    cc. Mesosternal lamina prominent, with distinct angle.
      Thorax piceous on the disk (.16–.22 in.). *Hamiltoni*, Horn.
      Thorax entirely testaceous (.18–.24 in.) . . . *diffusus*, Lec.

AA. Above black or piceous black, margin sometimes pale.
  d. Transversely very convex ; larger species.
    Thorax and elytra with pale border (.26–.28 in.). *cinctus*, Say.
    No pale border present (.28–.32 in.) . . . . . *consors*, Lec.
  dd. Sub-depressed ; smaller species (.16–.22 in.) . . *perplexus*, Lec.

Helochares, Muls.

Contains *H. maculicollis*, Muls.: .16–.22 in. long ; yellowish or testaceous above, with a rather large piceous thoracic spot ; head more or less piceous. Elytra with two series of coarse punctures on each (situated on the fifth and ninth intervals), and with ten moderately deep impressed striæ.

CYMBIODYTA, Bedel.

Form very broadly oval; serial punctures of elytra distinct at sides (.26–.28 in.).....*rotunda*, Say.
Form oval, serial punctures distinct (.18–.22 in.).....*fimbriata*, Mels.
Form oblong, serial punctures wanting (.16–.18 in.).....*lacustris*, Lec.

HELOCOMBUS, Horn.

Contains a rather large species (*H. bifidus*, Lec.), .22–.28 in. long, resembling the well-known *Hydrobius fuscipes*, L., from which it may be separated by having the last joint of the maxillary palpi shorter than the preceding.

HYDROBIUS, Leach.

This name is now applied only to the larger species thereunder included in the Check List, the small ones going into *Creniphilus*. They separate thus :

A. Brownish, elytra tessellate with darker (.28–.30 in.)..*tessellatus*, Ziegl.
AA. Black or piceous above.
b. Form oblong, elytra striæ distinct (.26–.32 in.).*fuscipes*, Linn.
bb. Form short, very convex, elytra punctate in rows.
Hind femora opaque and pubescent near base and along upper border (.30 in.).....*globosus*, Say.
Hind femora simply closely punctate near base, not pubescent (.34 in.).....*tumidus*, Lec.

CRENIPHILUS, Mots.

Smaller than the preceding, and usually found about pools. In form they differ among themselves, but are usually elliptical in outline and very convex. In the following table the name *feminalis*, Lec., is replaced by *infuscatus*, Mots.:

A. Form oblong, fully twice as long as wide; elytra narrowed behind, testaceous at sides (.06–.08 in.).....*suturalis*, Lec.
AA. Form elliptical, convex, not much longer than wide.
Colour above brownish to ochraceous (.08–.10 in.).....*infuscatus*, Mots.
Colour above black or piceous, more or less bronzed.
Prosternum distinctly carinate (.06–.08 in.).*subcupreus*, Say.
Prosternum simple (.10–.14 in.).....*digestus*, Lec.

CERCYON, Leach.

The species of this genus are mostly small; black or piceous, as a rule, and with more or less yellow on the tips of the elytra or sides of

the thorax. They are found on the sea-coasts under debris of various sorts, or inland about decaying animal and vegetable matter. A number of the names on the Canadian lists do not appear in the synopsis, having been reduced to synonymy as follows: the name *limbatus* gives way to *lateralis*, *flavipes* and *nigricollis* to *melanocephalus*, while *centromaculatus* becomes *nigriceps*. The figures of the metasternum are copied from Dr. Horn, and illustrate the characters on which the table is based.

A. Mesosternal area median only (fig. 14, a).

b. Thorax with incomplete basal line, elytra with large piceous post-median sutural spot (.12 in.)..... *unipunctatus*, Linn.

Fig. 14.

bb. Thorax without basal line.

c. Form oval, less convex, head oblique.

d. Elytra with sharply limited yellowish apical space.

Apical spot extending along sides (.10–.12 in.)..... *prætextatus*, Say.

Apical spot not extending along sides (.08 in.)..... *ocellatus*, Say.

dd. Elytra indefinitely paler at apex.

Elytra rufocastaneous, tip paler (.10–.12 in.)..... *lateralis*, Marsh.

Elytra piceous, paler at tip, eighth interval biseriately punctured (.10–.12 in.)..... *indistinctus*, Horn.

Elytra piceous, tip paler, eighth interval uniseriately punctured (.08–.10 in.)..... *analis*, Payk.

cc. Form very short and convex, head vertical.

Surface opaque (.06 in.)..... *lugubris*, Payk.

Surface shining (.06 in.)..... *navicularis*, Zimm.

AA. Metasternal area laterally extended (fig. 15, b).

b.
Fig. 15.

e. Thorax entirely black; no basal line.

f. Elytra piceous with pale apex, varying to castaneous; surface distinctly punctulate (.10–.12 in.)..... *hæmorrhoidalis*, Fabr.

ff. Elytra reddish, scutellar triangle and humeral stripe piceous.

Palpi pale, epipleuræ piceous (.08.–.10 in.)..... *melanocephalus*, Linn.

Palpi with last joint piceous, epipleuræ pale (05.–.08 in.)..... *pygmæus*, Ill.

ee. Thorax pale at sides, basal line distinct. Elytra pale with transverse piceous post-median band (.05.–08 in.)..... ....*nigriceps*, Marsh.

SPHÆRIDIUM, Fabr.

S. scarabæoides, Linn., has twice been reported from Canada, once in considerable numbers. It is a shining black insect about .25 in. long, the elytra with a reddish basal spot and a much larger terminal one. The colour varies a great deal in European specimens, but the species can easily be separated from any American Sphæridiini by its large size. The figure (fig. 16) is made from an English specimen.

Fig. 16.

MEGASTERNUM, Muls.

M. posticatum, Mann., has been (perhaps erroneously) recorded here. It is about .08 in. long, convex, blackish, subopaque, elytra paler at tip, the sides of the thorax and a humeral spot less distinctly so. Elytra finely striate, striæ punctured indistinctly at middle, plainly at sides and apex. Legs rufopiceous.

CRYPTOPLEURUM, Muls.

C. minutum, Fabr. (*vagans*, Lec.), represents the genus in Canada and may be known by the generic character given in the table in addition to its small size—.08 in.—rather deeply striate elytra, which are pale at apex and often also at sides, and the sparse pubescence, which is, however, often rubbed off in old or poorly-preserved specimens.

The principal works available for the study of the North American Hydrophilidæ are:—

1855. Leconte, J. L., Synopsis of the Hydrophilidæ of the United States. Proc. Acad. Nat. Sci. Phil., VII., pp. 356–375.

1873. Horn, Geo. H., Revision of the genera and species of the tribe Hydrobiini. Proc. Am. Phil. Soc., XIII., pp. 118–137.

1876. Horn, Geo. H., Synoptic tables of some genera of Coleoptera, with notes and synonymy. Tr. Am. Ent. Soc., V., pp. 246–252.

1878. Leconte, J. L., and Schwarz, A. E., The Coleoptera of Florida. Proc. Am. Phil. Soc., XVII., pp. 353–472 (*Cyclonotum* and *Ochthebius*).

1890. Horn, Geo. H., Notes on the species of Ochthebius of Boreal America. Trans. Am. Ent. Soc., XVII., pp. 17–26.

1890. Horn, Geo. H., Notes on some Hydrobiini of Boreal America, l. c., pp. 237–278.

1890. Horn, Geo. H., A revision of the Sphæridiini inhabiting Boreal America, l. c., pp. 279–314.

LIST OF COLEOPTERA COLLECTED AT MASSETT, QUEEN CHARLOTTE ISLANDS, B. C.

BY REV. J. H. KEEN.

(Continued from page 172.)

2931. Ptenidium pullum, Makl.—Not rare. In grass tufts in winter.
2951. Trichopteryx xanthocera, Matth.—Rare. Under log in February.
2952. Trichopteryx parallelopipeda, Matth.—Rare. In grass tufts in February.
2953. Trichopteryx diffinis, Matth.—Common in November in seed pods of foxglove.
Trichopteryx (?).—Numerous.
3058. Coccinella 9-notata, Hbst.—Abundant in summer. Emerge from pupal state during July.
3262. Coxelus pacificus, Horn.—Rare under bark.
3315. Pediacus depressus, Hbst.—Ground ; 7th May, 1891.
3316. Cucujus puniceus, Mann.—Occurs sparingly under bark. Flies in May.
3348. Dendrophagus glaber, Lec.—Not rare ; under loose bark of fences.
3363. Henoticus serratus, Gyll.—Abundant in decaying leaves and on skins.
3366. Cryptophagus, sp.—One only taken on dry skin.
3382. Atomaria planulata, Makl.—Four only, taken in rotten grass in July.
3384. Atomaria Kamtschatica, Mots.—In moss in February.
Atomaria, n. sp.—Window ; one specimen taken.
3486. Hister fœdatus, Lec.—One only taken, under rotten crab in garden in June. [Four taken subsequently.]
Pyromalus mancus, Casey.—Two taken *in cop.*, March 30th, in crevice of bark of spruce stump.
3662. Brachypterus troglodytes, Murray.—Numerous on nettles in May and June.
3699. Epuræa ambigua, Mann.—Abundant in April under loose bark of felled spruce.
3707. Epuræa fulvescens, Horn.—Not numerous. Berry bushes in June.
3709. Epuræa truncatella, Mann.—Common in July, under rotten turnips.
3727. Omosita colon, L.—Common during summer on bones.
3765. Rhizophagus sculpturatus, Mann.—Not rare, under loose bark.
3767. Rhizophagus dimidiatus, Mann.—Under loose bark.
3768. Rhizophagus brunneus, Horn.—One only in June on dry log.

3779. Stephostethus liratus, Lec.—Common on dry skins and leaves. Lathridius costicollis, teste Casey.

3821. Corticaria herbivagans, Lec.—Rare. In moss in February; in rotten grass in April.

3848. Peltis pippingskoeldi, Mann.—One only in July.

3875. Peltastica tuberculata, Mann.—Common in larder, on bread, etc.

3880. Amphicyrta simplicipes, Mann.—Occasionally in moss at tree roots in winter.

3882. Simplocaria nitida, Mots.—Numerous in moss at tree roots all winter.

3884. Pedilophorus acuminatus, Mann.—Not rare. In moss during winter.

3960. Heterocerus tristis, Mann.—Common in summer on green patches covered by tide at high water.

3988. Eucinetus infumatus, Lec.—Occasionally in water-bits. Once occurred in large numbers under loose bark of decaying spruce (in January), where larvæ, pupæ and adults were all represented.

3990. Eucinetus testaceus, Lec. (pale specimens)—Occurred with above-mentioned *Eucinetus infumatus* colony.

4065. Epiphanis cornutus, Esch.—Rare. On skins in July.

4152. Cryptohypnus musculus, Esch.—Rare. Under driftwood.

4218. Elater nigrinus, Payk.—Occasionally beaten from bushes under loose bark, 17 May, 1891.

4266. Megapenthes stigmosus, Lec.—Common during August.

4391. Athous ferruginosus, Esch.—Abundant in July and August.

4433. Corymbites resplendens, Esch.—Not rare. On wing during May.

4441. Corymbites furtivus, Lec.

4451. Corymbites caricinus, Germ.—Frequent in June on spruce.

4451. Corymbites caricinus, Germ., var. umbricola, Esch.—Common on wing from May onwards. Seen *in cop.*, May 19.

Corymbites spectabilis, Mann.—One only taken in July on wing.

4546. Throscus validus, Lec.—Common in windows in June. Never taken out of doors.

4785. Eros simplicipes, Mann.—Occasional. Flying during May.

4901. Podabrus piniphilus, Esch.—Common.

4919. Silis pallida, Mann.—Commonly swept from grass in June.

4956. Telephorus divisus, Lec.—Frequent in May and June on green patches covered by tide at high water.

5274. Hadrobregmus gibbicollis, Lec.—Rare. Taken on wing in July.
Platycerus Keeni, Casey.—Only one colony found, under a drift-log on sandy beach in April. A few probably immature specimens still retained a slightly reddish tinge. About a dozen were taken.

5467. Ægialia cylindrica, Esch.—Numerous under driftwood in May.

5471. Ægialia crassa, Lec.—Under log on sandy beach, April 20th. Numerous in summer, crawling on sand hills.

5476. Psammodius cælatus, Lec.—Frequent under driftwood on beach.

5523. Aphodius ruricola, Mels.—Common in excrement.

5644. Hoplia Sackenii, Lec., var.—One specimen only, found on ground.

5970. Asemum atrum, Esch.—Not common. Under bark and on wing in May.

5983. Opsimus quadrilineatus, Mann.—Found under bark in January.
Opsimus quadrilineatus (black var.).—Not uncommon; under bark of spruce fences all winter.

6232. Rhagium lineatum, Oliv.

6299. Leptura obliterata, Hald.

6350. Leptura Behrensii, Lec.—Wing-cases only found. February 18; under loose spruce bark.

6367. Plectrura spinicauda, Mann.—Common on spruce during summer. Varies much in size.

7226. Phellopsis porcata, Lec.—Rare. Two specimens only taken; one under bark, the other in a window.

7501. Phaleria globosa, Lec.—Numerous in April, crawling on sand.

7584. Ægialites debilis, Mann.—Several taken together with the larvæ.
Marolia Holmburghii.—Common from March onwards on spruce.

7723. Rhinosimus viridiæneus, Rand.—Frequently beaten from spruce and other trees in April.

7728. Ditylus quadricollis, Lec.—Common under logs on sandy beach in June and July.

7770. Anaspis rufa, Say.—Common during summer on Umbelliferæ.

7997. Dendroides ephemeroides, Mann.—Under alder bark. Not rare. Emerges from pupal form in July.

8288. Sciopithes obscurus, Horn.—Invariably from trees; never on the ground. (See 8297.) Common during summer. Beaten from berry bushes.

8297. Geoderces melanothrix, Kirby.—Under chips on the ground in great numbers and seldom on trees. (See 8288.)

8353. Trichalophus didymus, Lec.—Not common. Under logs and in rotton grass.

8470. Emphyastes fucicola, Mann.—Occurs but seldom, but then in great numbers. Under logs half buried in sand, during spring.

8471. Plinthus carinatus, Boh.—Our commonest weevil. Under logs.

8473. Pissodes costatus, Mann.—Not common. Beaten from spruce in April.

8598. Phycocœtes testaceus, Lec.—Not rare. Under drift-logs on beach in spring.

8599. Trachodes ptinoides, Germ.—Common. Under drift-logs on beach in spring. Seen *in cop.*, June 2nd.

8600. Trachodes 4-tuberculatus, Mots.—Not common. Found in July. Occasionally in moss at tree roots in winter.

8601. Trachodes horridus, Mann.—Common, under logs.

9042. Elassoptes marinus, Horn.—Found in extensive colonies under drift-logs in May.

9044. Rhyncolus brunneus, Mann.—Not rare ; in rotten wood.
Rhyncolus, n. sp.—Rare ; under driftwood on sandy beach in May and June.

9074. Pityophthorus nitidulus, Mann.—Not rare.

9093. Xyloterus bivittatus, Kirby.—Occurs sparingly on newly-cut logs and in moss at tree roots in winter.

9116. Dryocœtes autographus, Ratz.—Under spruce bark.

9119. Xylocleptes concinnus, Mann.—Very numerous in newly-fallen timber.

9142. Micracis hirtella, Lec.—Not rare.

9165. Hylesinus sericeus, Mann.—Not uncommon in dead bark.

9181. Dendroctonus rufipennis, Kirby, var. obesus (black form).—Fairly numerous in bark of newly-cut timber.

9187. Dolurgus pumilus, Mann.—Common in spruce bark.
Hylurgops glabratus.—Common under spruce.

9373. Euscaphurus saltator, Casey.—Common on under side of logs in damp places. [3987. Dascyllidæ.]

PRELIMINARY STUDIES IN SIPHONAPTERA—VII.

BY CARL. F. BAKER, FORT COLLINS, COLO.

The following list embraces all described species of the order Siphonaptera. For descriptions of all species known at the present time, see the preceding papers of this series, where will also be found a partial bibliography. For the complete bibliography and synonymy of all species published up to 1880, see Taschenberg's Die Flohe.

Order SIPHONAPTERA, Latr.

Family *Sarcopsyllidæ*, Tschb.

Genus *Sarcopsylla*, West.

1. S. penetrans, L.
2. S. gallinacea, West.
3. S. grossiventris, Weyenb.

Genus *Rhynchopsylla*, Haller.

4. R. pulex, Haller.

Family *Vermipsyllidæ*, Wagner.

Genus *Vermipsylla*, Schimk.

5. V. alacurt, Schimk.

Family *Pulicidæ*, Tschb.

Genus *Pulex*, Linn.

6. P. kerguelensis, Tschb.
7. P. tuberculaticeps, Bezzi.
8. P. globiceps, Tschb.
9. P. pallidus, Tschb.
10. P. simulans, Baker.
11. P. irritans, L.
12. P. echidnæ, Denny.
13. P. avium, Tschb.
14. P. glacialis, Tschb.
15. P. Wickhami, Baker.
16. P. Gillettei, Baker.
17. P. fasciatus, Bosc.
18. P. Howardii, Baker.
19. P. coloradensis, Baker.
20. P. ignotus, Baker.
21. P. hirsutus, Baker.
22. P. Bruneri, Baker.
23. P. sciurorum, Bouche.
24. P. melis, Walk.
25. P. longispinus, Baker.
26. P. montanus, Baker.
27. P. pencilliger, Grube.
28. P. metallescens, Kol.
29. P. gigas, Kirby.
30. P. serraticeps, Gerv.
31. P. erinacei, Bouche.
32. P. inæqualis, Baker.
33. P. goniocephalus, Tschb.

Genus *Hystrichopsylla*, Tschb.

34. H. obtusiceps, Ritsema.

Genus *Stephanocircus*, Skuse.

35. S. dasyuri, Skuse.

Genus *Typhlopsylla*, Tschb.

36. T. unipectinata, Tschb.
37. T. octactenus, Kol.
38. T. hexactenus, Kol.
39. T. pentactenus, Kol.
40. T. dictenus, Kol.
41. T. musculi, Duges.
42. T. caucasica, Tschb.
43. T. assimilis, Tschb.
44. T. gracilis, Tschb.
45. T. fraterna, Baker.
46. T. alpina, Baker.
47. T. americana, Baker.

THE GENERIC TYPES INCLUDED IN APATELA.

BY A. R. GROTE, A.M., HILDESHEIM, GERMANY.

In 1875–6 I pointed out that the earliest name for the genus, which is commonly called "*Acronycta*" by authors, is *Apatela*, Hubn., 1806; the type and sole species cited in the Tentamen being the European *A. aceris*. My attempts to group the American species and bring them into correspondence with the European forms under subgeneric titles are unsatisfactory, as I have not been able to compare sufficiently the European species in all stages with our own. I have thought it useful to give here a list of the generic names used by me with their types. These latter must be carefully studied in any revision of the group, so that the natural limits of the divisions can be ascertained. In view of the fact that the larvæ differ quite strongly in different species, these peculiarities having probably arisen under adaptation to mode of life and environment, also from mimicry, it will be interesting to correlate the groups by characters drawn from all the stages. At the same time it will be safer to found subgeneric divisions only upon peculiarities, however slight, offered by the moths alone.

APATELA.

1806. Hubn., Tent. 1, *aceris*. Sole species and therefore type.

1816. Ochs. 4, 62, refers *aceris* with thirteen other species to the genus *Acronicta*, and cites Hubner's *Apatelæ* as synonymous. Afterwards the name is credited to Stephens or Ochsenheimer, and Hubner's connection with the name is overlooked.

1875. Grt., Bull. B. S. N. H. 2, 213, refers the N. Am. species hitherto placed under *Acronycta* to *Apatela* and designates *aceris* as the type.

ACRONICTA.

1816. Ochs. 4, 62: *leporina* with thirteen other species.

1818. Hubn., Verz. 201: *leporina* and *bradyporina* alone, thus restricting the term.

1874. Grt., List Noct. 7, takes *leporina* as the type.

This name, altered in spelling to "*Acronycta*," is used generally by authors for the entire genus, but it should be restricted to the group indicated by me, Papilio, 3, 68, of which the European *leporina* is typical, and to which our American *lepusculina*, *felina* and *vulpina* appear to belong.

HYBOMA.

1818. Hubn., Verz. 200: *strigosa* and *unicornis*.

The latter is a Notodontian belonging to *Schizura*, and *strigosa* should apparently be taken as type. I have not compared the species and do not know whether it has allies in the American fauna or not.

TRIAENA.

1818. Hubn., Verz. 200: *psi*, *cuspis*, *tridens*, *tritona* and an undescribed species.

1883. Grt., Papilio, 3, 67: designates *psi* as type and refers here as well a number of American species. This group has been treated by some European authors as of structural value (consult Guen. Spec. Géneral). *Occidentalis* is a typical representative American species.

JOCHEAERA.

1818. Hubn., Verz. 201: *alni*. Sole species and therefore type.

1883. Grt., Papilio, 3, 111: designates *alni* as type and refers here our North American *funeralis*.

PHARETRA.

1818. Hubn., Verz. 202: *Auricoma* and *menyanthidis*.

The type may be taken as *auricoma*. By a singular error I have taken this species as the type of the subgenus *Apatela* in Papilio, 3, 115, repeating the mistake in CAN. ENT., XVII., 94, where I have written "auricoma" in the text instead of "*aceris*" on page 94, the latter species being, from the context, evidently the one intended. In the list of species (p. 96) I have again wrongly used *Apatela* for the subgenus instead of *Pharetra*. The species in our fauna there cited are assumed by me to belong to the group of *auricoma*, and this seems certainly to be in part probable.

ARCTOMYSCIS.

1818. Hubn., Verz. 202: *aceris*, *euphorbiæ*, *esulæ*, *euphrasiæ*, *cyparissiæ*, *megacephala*.

1883. Grt., Papilio 3, 113, takes *euphrasiæ* as type, and refers the North American *sperata* as belonging here.

The genus, as proposed by Hubner, has mixed contents, and it seems quite certain that *aceris* is not structurally identical with *euphrasiæ*.

Two names proposed by myself: *merolonche* with the type *spinea*, and *Eulonche* with the type *oblinita*, may be assumed, with but little doubt, as being of generic importance. There remain to be considered *Megacronicta* with the type *americana*, probably distinct structurally from either *aceris* or *leporina; Lepitoreuma* with the type *ovata*, and *Mastiphanes* with the type *xyliniformis*. None of these groups seem to be represented in Europe, so far as my studies of the European species allow me to judge at present. The larval forms of these subgeneric types will throw some light on the phylogeny of the group, but are perhaps chiefly interesting as illustrating the range of character shown by the independent larval stage.

BOOK NOTICES.

RAMBLES IN ALPINE VALLEYS, by J. W. Tutt, F.E.S.; 208 pages, 5 plates. London: Swan, Sonnenschien & Co. (Price, 3s. 6d.)

The editor of the "Entomologist's Record and Journal of Variation" has added another to his popular books on the beauties of Nature. This time he takes the reader abroad to the lovely scenery of Switzerland, on the Italian slopes of Mont Blanc, where he wanders for the most part out of the beaten track of the ordinary tourist. Much of the volume is filled with charming pen-pictures of the infinite variety of grandeur and beauty to be found among the lofty mountain tops, the towering crags, the densely-wooded ravines and the dashing torrents of this secluded Alpine region. The eye of the naturalist does not fail to observe the marvellous variety of animal and vegetable life that is to be found in this limited area, and the author describes many a plant and flower, and especially the gay butterflies and pretty moths with which the region abounds. Some of the most interesting passages are those that deal with the phenomena of variation caused by environment, the results of the glacial epoch in the distribution of species, the effect of altitude on plants and insects, the evolution of the genus *Colias*, the production of colours, the causes of hibernation, and other topics which arise from time to time as the author rambles through the valleys or climbs the Alpine hills. The perusal of such a book as this must help the reader to see and observe, and lead him on to think out for himself the causes and the objects of the life that everywhere surrounds him.

LIST OF NORTH AMERICAN EUPTEROTIDÆ, PTILODONTIDÆ, THYATIRIDÆ, APATELIDÆ AND AGROTIDÆ: BY A. RADCLIFFE GROTE, A. M., ABHANDLUNGEN DES NATURINSSENSCHAFTLICHEN VEREINS ZU BREMEN., VOL. XIV., 1895.

In this list are given, besides the usual series of names and synonyms, the habitat of each species, the dates of the genera with their synonyms, and the family and generic types. "The present list aims to give the proper application of the oldest generic names and to fix the exact type." Therefore, certain changes are made from the accepted nomenclature, which we may briefly notice. Ptilodontidæ for Notodontidæ, from the Ptilodonte of Hübner, which appears to be the oldest application for this family. In the family certain generic changes are made. Chatfieldia, Grt., n. gen. to include *Phersia simplaria* and *P. basitriens;* Ptilodon, Hubn., to replace Lophopteryx, Steph.; Eunystalea, Grt., n. gen. to include *Nystalea indiana.* Lochmaeus and Seirodonta are recognized as valid genera.

In the Thyatiridæ, Persiscota, Grt., n. gen. to include *Euthyatira lorata, semicircularis* and *candida.* The Apatelidæ include those genera formerly known as Bombycoidæ. The definition of the family appears to rest upon larval characters, and we should expect to find in it only those species of noctuidæ which have "Bombycid" (*i. e.* Arctian) larvæ —that is, with the abdominal feet equally developed and the tubercles converted into warts. The larvæ of several of our genera are still unknown, but Mr. Grote includes Raphia among his Apatelidæ, though the larva has the two anterior pair of feet smaller than the other, and the setæ perfectly simple and single throughout its life-history. On the other hand some of the genera at the head of the next family should probably be placed among the Apatelidæ. This is certainly the case with *Microcoelia fragilis*, the larva of which I discovered last year. Mr. Grote uses the name Apatela, Hubn., instead of Acronycta. The name Agrotidæ is proposed for the customary Noctuidæ, as the term Noctua is preoccupied in Birds. The list is not complete in this family. "The subfamilies Catocalinæ and Deltoidinæ are not given." Under Agrotis the genitalic divisions of Prof. Smith are given subgeneric value only, a proceeding which commends itself to the present reviewer. For Noctua, the Hubnerian term Amathes is employed; for Rhizagrotis, Smith, Ogygia, Hubn. For further details the list itself may profitably be consulted.

HARRISON G. DYAR.

BEETLES OF NEW ENGLAND AND THEIR KIND; a guide to know them readily. By Edward Knobel. Boston: Bradlee Whidden, 18 Arch street. (Price, 50 cents.)

Every collector of insects naturally desires to obtain the names of the specimens that he has procured. Any work that will help him in this respect is to be welcomed, and no doubt many a beginner will be glad to know of this cheap "Guide to Beetles," whose brief descriptions and hundreds of wood cuts will enable him to identify many of the conspicuous specimens that he meets with. It is a praiseworthy attempt to popularize the collecting of insects, and will, we trust, encourage many after they have found out the names to go on and study the life-history and structure of these interesting creatures. It implies a singular want of care to find that so many of the names are incorrectly spelt, when a reference to Henshaw's List would so easily have prevented a defect of this kind.

NOTES ON BUTTERFLIES.

Years ago, when Mr. Edwards made his interesting experiments with chrysalids of *Phyciodes tharos* by exposing them to a low degree of temperature, artificially produced, the results obtained in the way of suffusion in the butterflies emerging from them led one to look for like results from similar out-of-door exposure. The climatic conditions this year in this locality were especially favourable for such results. A period of unprecedented heat, from May 13–18, was followed by a cold wave of a week's duration, accompanied by two frosts.

On the second of June I found a specimen of *P. tharos* fresh from the chrysalis and much suffused, the ground colour of the wings above being almost black, with a thin sprinkling of orange-coloured scales and two or three orange-coloured spots near the base of each, and a sub-marginal row of orange-coloured crescents on the secondaries. It is considerably darker than any figured by Mr. Edwards on Plate II. of Phyciodes in his "Butterflies of North America." The capture is interesting, as the specimen must have been in the chrysalis state during the cold period.

On the 30th of May I took a fresh specimen of *Feniseca Tarquinius* in Malden, and another on the 17th of June in Wollaston. Both of these localities are within three miles of Boston. So far as I know these are the first instances of its capture in Mass., east of the Connecticut River valley.

During June, I also took in Wollaston three specimens of *Amblyscirtes samoset*, an exceedingly rare insect in this vicinity.

Wollaston, Mass. FRANK H. SPRAGUE.

Mr. James Walker reports the capture of *Thecla acadica* at Orillia, in the middle of July.

Mr. J. Alston Moffat states that *Argynnis Atlantis* has for the first time been taken at London at the end of June and during July; it has also been abundant at Sarnia and Windsor.

CORRESPONDENCE.

MELSHEIMER'S SACK BEARER.

Mr. C. G. Anderson has contributed of his own capture, a fine specimen, and the first in the Society's collection, of that interesting, and, with me, rare moth *Perophora Melsheimerii*, Harris. I have never met with it in my collecting. I have often found its cases and living larva within when beating bushes, but never succeeded in rearing them. As they pass the winter in the larval state, I could not keep them in a dormant condition until their food plant, the oak, came out in spring. It is a handsome insect, with finely-curved costal edges and hooked tips to its front wings; bearing a strong resemblance, as Harris remarks, to *Bombyx mori;* but more attractive in colour and ornamentation.

J. ALSTON MOFFAT.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The Seventh Annual Meeting of the Association of Economic Entomologists will be held at Springfield, Mass., on the two days immediately preceding the general sessions of the American Association for the Advancement of Science, *i. e.*, Tuesday and Wednesday, August 27 and 28, 1895. Room 4, second floor of the High School, has been assigned for this purpose, where the meetings will be called to order at 10 A. M. and 2 P. M. on the days mentioned.

Information as to hotel and railroad rates, together with the preliminary announcement of the A. A. A. S., may be obtained by addressing W. A. Webster, local Secretary, Springfield, Mass.

C. L. MARLATT
(Washington, D. C.),
Secretary.

PROF. J. B. SMITH,
President.

Sir,—I desire, on behalf of the Entomological Society of Ontario, to acknowledge the receipt—through Mr. H. H. Lyman, of Montreal—of the specimens of Nemeophila petrosa and plantaginis from which the plate was made for illustrating Mr. Bean's paper in the April number of CAN. ENT.,—in excellent condition.

J. ALSTON MOFFAT, Curator.

DEGHUEE ALUMNI.

A dinner was given to Prof. Jos. Deghuée, of the old State Street School, Brooklyn, N. Y., on April 9th, by seventy graduates. Among these were Senator Luxow; F. W. Hinoides, Registrar; Rufus Zogbaum, Artist; Cashier William Halls; DeWitt Webb; John H. Walsh, and other prominent officials and merchants. The School is of interest as having turned out three students of American Entomology: Ed. L. Graef, who presided on this occasion; Fred Tepper, and A. Radcliffe Grote, whose names are known to readers of the CAN. ENT. Prof. Deghuée is a graduate of the University of Bonn, and for fifty years has been active as a teacher in Brooklyn. The following lines, by A. Radcliffe Grote, were sent by the author from Bremen, and were read during the evening by Mr. Albert Steiner:—

A moment pause! The air is stirred
From far across the main;
A scholar's waiting for the word,
Wants to be heard again.

Look round the board! Of all you taught,
If few attend to-day—
If any of us came to naught,
If others made their way.

All loved you. More can not be said,
O, teacher, wise and true!
The light that you upon us shed,
In love returns to you.

Fill for the absent ones a cup,
Whose hearts are yours alway;
And fill the goblet brimming up—
A thousand healths—*Deghuée!*

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NOTES ON COLLECTING BUTTERFLIES IN WESTERN COLORADO, WITH A PARTICULAR ACCOUNT OF CERTAIN PAPILIOS.

BY WM. H. EDWARDS, COALBURGH, WEST VA.

In Vol. XXV., p. 253, I gave some account of the dimorphism of *P. Bairdii*, mainly from the observations and experiments of Mr. David Bruce. From what he had seen at Glenwood Springs, Colorado, he had satisfied himself that not only *Bairdii* and *Oregonia* were one species, but that *P. Hollandii*, Edw., formed part of the same. Though the two first named differ in facies more decidedly than do *Turnus* and *Rutulus*, and *Rutulus* and either *Eurymedon* or *Daunus*. *Hollandii* looks on the upper side like *Bairdii*, but beneath, while in general like *Bairdii*, the yellow spots are larger, making the surface much gayer. But the notable difference is in the markings of the body; *Hollandii* having the yellow, black-striped body of *Oregonia* (as well as *Zolicaon* and *Machaon*), while *Bairdii* has the solid black body of *Asterias*, with similar rows of yellow dots. *Hollandii* therefore has the body of *Oregonia*, with the wings of *Bairdii*, the latter somewhat modified.

In 1892, Mr. Bruce obtained eggs by confining a *Bairdii* ♀ over the food plant, and out of two pupæ which alone survived a catastrophe at his home (Brockport, N. Y.) came a *Bairdii* imago the next spring in his hands, and a female *Oregonia* with me. Mrs. Peart had received a few of the larvæ out of that lot of eggs, and from these came one *Bairdii* and one *Oregonia*. I related these facts in the paper spoken of, and then said that two of the pupæ which Mrs. Peart had were still alive, and would give butterflies the second year, or in 1894. It turned out that one *Bairdii* ♀ did come from one of these pupæ, April 25th, 1894, but the other pupa had died.

In 1893, at the same place, Mr. Bruce sent me two eggs obtained from an *Oregonia* ♀ in confinement, from one of which resulted a *Bairdii* ♂ the same season, the other larva dying. And about two weeks later he sent me another lot of *Oregonia* eggs, from which I got four *Bairdii*: 2 ♂, 2 ♀, the same season, no pupæ hibernating.

If there was no error in getting the eggs, such as overlooking eggs that had been laid on the plant before the female was tied to it, then there could be no question of dimorphism, for the eggs that I received were mailed the day they were laid, so that there was no opportunity for any mixing up of larvæ. As Mr. Bruce is an entomologist of many years' experience, and had, as he assured me, taken the utmost care in these experiments, knowing their importance, the facts showed dimorphism, and of a remarkable sort. There was nothing like it in the North American butterfly fauna.

Mr. Bruce's visits to Glenwood Springs began in 1888, and from the first he had noticed that *Bairdii* and *Oregonia* were always associated, and in about equal numbers. But it was a long time before he discovered the food plant. Some one brought him a green, black-striped caterpillar, taken on Artemisia dracunculoides, which looked like an *Asterias* in its last stage. From the pupa produced came a *Bairdii* imago. Then he began to get eggs by confining the females over the Artemisia. It seems a strange food for one of the *Asterias* or *Machaon* groups; all the known species, except *P. Indra* (that is to say, all the species whose larvæ are known), feeding on Umbelliferæ, fennel, carrots, and the like. Artemisia belongs to the Compositæ. It is true the larvæ of the Papilios I am treating of will eat carrot, parsnip and fennel in confinement, but not willingly, and both Mr. Bruce and myself, also Mrs. Peart, have found the mortality excessive when feeding on those plants. There were large fields of carrots about the Springs, and we inquired of several of the owners if they had ever noticed the green caterpillars, but found no one who had done so. The Artemisia grows everywhere in the valley of Grand River and its tributaries, and often covers the ground over large areas. It stands about three feet high: a loose, open-growing plant, with many long stems shooting up from the base, or branching at a small angle from the main stem, and these bear very small leaves. One can look through a large clump of it and a caterpillar of the Papilios could not easily escape observation. The yellow eggs, too, are in strong contrast with the peculiar gray-green of the leaves, and would easily be seen.

Mr. Bruce has never caught the two forms in copulation, though he seemed to miss it more than once by a very little. He had written me that on one occasion he saw an *Oregonia* ♀ pursued by two males same, and also by three males *Bairdii*, rolling through the air like a ball, and so low down that he made effort to catch them all with a throw of his net;

but they whirled away and passed out of sight. On another day he had seen a newly-emerged female *Bairdii*, and was near it, but a low intervening bush prevented him using the net. Just then down pounced a male *Oregonia*, and the pair rose vertically in the air, circling about each other—as butterflies do in courtship—and were soon lost to view. These and other similar observations had made Mr. Bruce believe firmly in the inter-copulation of the two species.

The relation of the facts then known in the CAN. ENT. excited some little interest and some surprise, together with more or less incredulity; and I determined to accompany Mr. Bruce on his 1894 trip to Glenwood Springs, if he would let me, and go through the necessary experiments with him. Though if I had been as well acquainted with Mr. Bruce as in his company for six or seven weeks I became, I might have saved myself the journey, for nothing can be more thorough than his method of working. Nothing escapes him, and he makes no mistakes. But I am glad that I had the pleasure of his personal acquaintance and company, and I can commend Mr. Bruce as a companion and chaperon through Colorado to any lepidopterist in search of pleasure and specimens for his collection.

We reached Glenwood Springs on twenty-ninth June, from Denver, by the Rio Grande R. R., via Pueblo and the Royal Gorge Canon of the Arkansas River, which river was followed many hours to Leadville—elevation, 11,000 feet; then descended the Eagle River (a tributary of the Grand) to the Springs. The Grand River is one of the two principal streams which form the Colorado River, the other being Green River;—the junction in Utah. The whole region is semi-desert, and nothing grows without irrigation except the native clothing of grasses and scrub, and such pines and other trees as will stand the dry climate. The sun shone clear nearly every day that I spent at the Springs; very hot after 8. a. m.; with occasional showers. But in August, which the people call the "rainy season," there was rain pretty nearly every afternoon; and in all there were two or three days that might properly be called rainy. The elevation of the hotel is 5,700 feet—high enough to ensure cool nights all the summer; and the mountains rise quite abruptly from the river, sometimes precipitously, to the height of 2,500 or 3,000 feet more. Everywhere the bottoms are narrow, and the road above the hotel has been cut out of the slope of the hill. Wherever there is a space fit for cultivation, from half an acre to twenty or thirty,

some one is in possession, and the land is irrigated by means of the water that comes from every gulch and hollow, producing abundance of root crops and all sorts of fruit—apples, plums, peaches; (but no corn).

The morning after our arrival, Mr. Bruce showed me the river road mentioned—a narrow, single track, invariably spoken of as "the trail," now hot, dry, and covered with dust an inch or more thick. Where the hill had originally sloped to the water's edge, the trail had been cut through the rocks, and wherever there had been a little wider space, the base of the hill to the road was covered with small pieces of rock that had fallen from above. All along were clumps of Artemisia dracunculoides, and here and there were thistles in bloom. About these last Papilios were flying: a few *Bairdii*, *Zolicaon*, *Daunus*, *Rutulus*, *Eurymedon;* not one of which I had ever seen in life before. Also on same flowers, Pieris *Occidentalis*, and some Lycaenidæ and Hesperids. Satyrus *Paulus* now and then started up from the ground, or was seen flying slowly over the broken rocks. We took half-a-dozen male Neominois *Dionysius*, Scudder, a rare species described from Arizona or Utah, very little known by anybody until Mr. Bruce found it at Glenwood Springs, in 1888. This butterfly has never been seen on a flower or at water, but rises out of the dust at one's feet and alights at a little distance in dust again, or else on the adjacent rocks, springing up like a grasshopper, and, like that, turning its body around as soon as it strikes the dust or the rocks before settling quietly. The temperature was high, and the rocks were hot enough to roast eggs; yet these creatures were manifestly comfortable. The Papilios were none of them fresh—most of them worn and broken, and evidently they were the last of the early brood.

The next day, July 1st, Mr. Bruce went out alone in the opposite direction from the Hotel, and returned about noon with 3 ♀ *Dionysius*, 4 ♀ *Bairdii*, 1 ♀ Sat. *Paulus*, and 1 ♀ *Zolicaon*; all which we bagged for eggs; the Papilios on Artemisia, the Satyrids on grass. The *Zolicaon* seemed to be in just the condition to give eggs, but refused.

On the 3rd July was brought in a female *Oregonia*, and a typical ♀ *Hollandii*. Also 2 ♀ *Bairdii*, and a ♀ Coena. *Ochracea*, all which were tied up. The *Hollandii* beat herself in pieces and died without having laid an egg; and we never took another female of this form. In all we got 38 eggs of *Dionysius*, 12 of *Ochracea*, and the *Oregonia* laid 81. The Satyrid eggs were immediately mailed to Mrs. Peart, at Philadelphia, who had kindly undertaken to help me in rearing any larvæ. The

Paulus died without eggs; and we were never again able to take a female of this fine species. The butterflies are not uncommon, but live among bushes and scrub, where it was not possible to use the net. Dr. Skinner has somewhere set down *Paulus* as synonymous with *Sthenele*, which is very wide of the mark indeed.

July 2nd, a friend who was staying at the Hotel sent us with his buckboard and driver up the next mountain trail south and back of the Springs. We turned up a ravine through which ran a swift brook, and, sometimes walking, sometimes riding, reached a height of about 2,500 feet above Grand River, going in all perhaps five miles. From the start we saw butterflies; below and along the brook, Satyrus *Ariane*, *Charon*, and in the bushes, *Paulus*; for several hundred feet rise, either in the road or on the dry and naked slopes of the hill, *Dionysius*; and wherever there were scrub oaks, Thecla *Chrysalus*, var. *citima*, H. Edwards. Scores of these last could have been taken as they rested on the oak leaves. This, according to Mr. Bruce, is the only form of the species taken at Glenwood, but to the east, near Denver, it is not found at all, while typical *Chrysalus* abounds. At about 1,500 feet there was a wide curve in the road, and just there was a spring from which a little water trickled down the track for half-a-dozen rods. Where the road bent, a footpath came in from above. Here, about the wet road, and on the path, we had a good breathing spell, and took many butterflies: *P. occidentalis*, *P. Beckerii*; Colias *Alexandra*; Argynnis *Nevadensis*, *A. Behrensii* (heretofore reported only from Mendocino County, California, and exceedingly rare in collections); Melitæa *Palla*, *M. Augusta* (another rare Californian species); Phyciodes *Carlota* and *Camillus*; *Pyr. Cardui*; Grapta *Satyrus*; Satyrus *Ariane*, *Charon*, *Paulus*; Chionobas *Chryxus* (very large specimens and very yellow). This last species flew leisurely along, alighting on the wet ground, and if disturbed did not fly wildly; in fact, behaved much like Satyrus *Nephele*. Took or saw half-a-dozen *C. Ochracea*, most of which came flying down the path spoken of. Nothing can be prettier than this insect on the wing, as it flutters along, flying low, and it appears a great deal brighter yellow than is shown in dead specimens. We also took Limenitis *Weidemeyerii*; Chrysophani *Virginiensis*, *Behrii* and *Zeroe*. This last is a very pretty species; the yellow of the under surface much brighter than in dead examples. We took about a score of them, all males. *Zeroe* flies even in British Columbia, east of the Cascade Mountains. Of Lycæna, we took *Fulla*,

Clara and *Amyntula*; of Hesperians, Eudamus *Nevada*, Nisoniades *Propertius;* Pamphila *Campestris;* Amblyscirtes *Aenus*. Higher up the mountain we met with nothing new. Although so little rain had fallen, and the ground seemed dry as a desert, yet along the entire drive were beautiful and showy flowers, great clumps of purple Penstemons, white and yellow Oenotheras, and others, the names of which I know not.

On July 6th, Mr. Bruce brought in two great-bodied females *Bairdii*, and these gave 117 and 76 eggs respectively. All the Papilios now were fresh, and of the second brood of the year. Mr. Bruce also took a Neonympha *Henshawii*, the first he had ever seen in this region; also Theclas *Edwardsii* and *Titus*, and Pholisora *Catullus*.

On the 10th, a fine and typical ♂ *Hollandii* was taken, matching completely the female before spoken of; and no other such male was taken during our stay. A ♀ *Oregonia* was bagged on the 11th, and the same day a *Bairdii*, confined two days before, was found to have laid 70 eggs.

I had now two lots of eggs of *Oregonia* and four of *Bairdii*. When the females were bagged, Mr. Bruce and I were in all cases together, and both examined the plants to see if perchance a stray egg might have been previously laid on them by some other Papilio. And I may say here that neither of us saw more than an occasional egg on any plant of Artemisia in the six weeks. The plants are by thousands and the butterflies few. All the bags were back of and close to the electric power house of the Hotel, where were conveniences for shading them from the fierce heat of the sun, and where there was no danger of trespassers—two-legged or four-legged. When the bags were opened, I attended to the eggs myself, clipped them off the stems, and put each sort in a box by itself. Thenceforth all eggs and larvæ were in my room at the Hotel, and were attended to solely by myself. So there was nowhere a chance of mixing up eggs or larvæ, or of error. The bits of stem which carried the eggs were placed in glass tumblers, labelled, and when the larvæ hatched, fresh stems were given, and these were changed daily. As the larvæ grew, they were shifted to tin cans covered with cloth, and overlaid by squares of heavy glass, to prevent escape as well as to afford light. Treated in this way there was scarcely any loss.

On 15th July Mr. Bruce left me for Denver and the high peaks about Hall Valley, in order to get eggs of Chionobas *Œno*. From

Denver he wrote me he had concluded to come back to that place after he had worked at Mt. Gibson, and go home. Thereupon I divided the six lots of Papilio larvæ, and sent him one brood of *Oregonia* and two of *Bairdii*; and, although he did return to Glenwood Springs, 28th July, I had no more to do with his half of the larvæ. Thenceforth we made no more efforts to get eggs, as it was not worth while to try and rear larvæ in New York or in West Virginia, by reason of the great mortality sure to be suffered in feeding with umbelliferous plants. Mr. Bruce made many excursions in the hope of taking typical *Hollandii* of both sexes, but in vain. On one occasion he brought in a single Neophasia *Menapia*, and several times Argynnis *Leto*, now fresh from chrysalis. On 30th July, several fresh males of Argynnis *Nevadensis*, evidently of a second brood, and thirty *Bairdii* and *Oregonia*. The next day I went with him to the place where the Papilios had been taken, along the railroad up the Roaring Fork of Grand River. There, on thistles exclusively, we took thirty-four more *Bairdii* and *Oregonia*. A field of alfalfa was in flower just over the fence, but the Papilios did not frequent that. There were, however, on the alfalfa many of the yellow form of *Eurytheme*; namely, form *Eriphyle*, Edw. This form was often seen within the grounds of the Hotel, and elsewhere as we rode about the region. But I never saw an example of the orange form or forms (for there are three of them), nor have I ever seen a live *Eurytheme*, orange. Mr. Bruce says that when he first collected in Colorado, in 1888, the orange was not uncommon, either in the Denver district or at Glenwood Springs. But year by year he has noticed the diminishing number of the orange, and the increase of the yellow form; and it is his opinion that cultivation of alfalfa is responsible for this change.

On our way up the Rocky Fork we passed a slaughter-house in a small hollow, which was at the foot of a lofty and precipitous cliff of red sandstone; and about, on the ground, fences, and roof, were perhaps three-score ravens and half as many magpies, not at all shy or difficult to approach. We were told the ravens made their nests on the adjacent cliffs. Now, in all my years before I never saw more than two or three ravens, and then flying half a mile high in W. Va.

Besides the species of butterflies enumerated, I find but one other noted down as seen at Glenwood, and that was Satyrus *Boopis*, of which two examples were taken. Our conclusion on the butterflies in general was that while individuals were plenty, the species were really few; and probably nothing else should be looked for in a semi-desert region.

On 10th August we left for Denver, taking the road up Roaring Fork to Leadville. In all my rides through Colorado I was struck by the absence of large trees, and do not remember having seen a tree two feet in diameter in the State. We rode through miles and miles of small, dead timber, probably fifty miles, killed by forest fires.

When I left the Springs my larvæ were nearly full-grown, and a few had suspended for pupation. I put the three lots into three boxes with fresh Artemisia for such larvæ as were still feeding. I also had had made a capacious tin box, and filled it with the plant. And I kept the boxes by me throughout the journey to Coalburgh. When there, after the Artemisia gave out, carrot and fennel were substituted, but many of the larvæ died in consequence.

The imagos began to come forth at eleven and more days from pupation, but many pupæ hibernated, some to give imagos in April, 1895, and an occasional one in May and June, while several will go over to 1896.

The results in fall of 1894 were :

1. From *Oregonia* eggs, 3 *Oregonia :* 1 ♂, 2 ♀.
   8 *Bairdii :* 7 ♂, 1 ♀.
2. From *Bairdii* eggs, 1st lot, 20 *Bairdii :* 18 ♂, 2 ♀.
   No *Oregonia.*
   From *Bairdii* eggs, 2nd lot, 2 *Bairdii :* 1 ♂, 1 ♀.
   No *Oregonia.*

The results in spring of 1895 were :

1. From *Oregonia* eggs, 5 *Oregonia :* 3 ♂, 2 ♀.
   4 *Bairdii :* 2 ♂, 2 ♀.
2. From *Bairdii* eggs, first lot, 11 *Bairdii :* 8 ♂, 3 ♀.
   1 *Oregonia :* 1 ♂.
   From *Bairdii* eggs, second lot, 3 *Bairdii :* 2 ♂, 1 ♀.
   1 *Oregonia :* 1 ♂.

Result in fall and spring :

1. From *Oregonia* eggs, 8 *Oregonia :* 4 ♂, 4 ♀.
   12 *Bairdii :* 9 ♂, 3 ♀.
2. From *Bairdii* eggs, both lots, 36 *Bairdii :* 29 ♂, 7 ♀.
   2 *Oregonia :* 2 ♂.

In all, 10 *Oregonia :* 6 ♂, 4 ♀.
48 *Bairdii :* 38 ♂, 10 ♀.

The proportion of *Oregonia* to *Bairdii* nearly as 1 to 5. On 8th of July, 1895, I had nineteen pupæ left, which will go over a second

winter, viz., 5 *Oregonia;* 14 *Bairdii;* and most of them, by their size, I consider to be females. Of the entire number of pupæ (77), forty per cent. gave butterflies in the fall of 1894, thirty-two per cent. in spring of 1895, and twenty-eight per cent. will probably go to 1896.

I spoke of Mr. Bruce going after eggs of Chionobas *Œno.* The weather at Denver was fair just at that time, but at Hall Valley (11,000 elev.), and on the peaks, as forbidding as could be ; day after day during his stay at his old cabin near top of Mt. Gibson, rain, snow and fog. But he found specimens of *Œno* resting under the shelter of rocks, and took some females by hand. These he brought to Hall Valley, and being confined over grass in the house there, they laid forty-five eggs, which were sent to Mrs. Peart, and in her care they hatched and the caterpillars reached pupæ the same season. Mrs. Peart was able to get the entire set of drawings of the early stages, and they will be given in Part XVII., Butt. N. A., in due time. It is enough that these stages support the conclusions I had published, that *Œno* is a distinct species from *Semidea.* My trip to Colorado was as much to get eggs of *Œno* as to rear the Papilio larvæ, and the success in one case, as in the other, is owing to Mr. Bruce's efforts.

I have in this, and the paper in Vol. XXV. referred to, spoken of the two Glenwood Papilios as *Bairdii* and *Oregonia,* but being hybrids, neither form is often true to type. Some *Bairdii* are typical; that is, they can not be distinguished from the examples taken in Arizona, where there are no *Oregonia,* and can be no intermixture. But most depart in different degrees from the type, no two being quite alike ; are gayer, with yellow markings on the upper side, and much more so beneath, running off to *Hollandii,* which seems to be the extreme of variation.

Scarcely any of the so-called *Oregonia* taken or bred at Glenwood Springs agree fully with the type found, which flies where there are no *Bairdii,* in Washington and British Columbia. They are modified in the direction of *Bairdii* in several particulars. The typical male *Oregonia,* on the upper side, *has the basal area of the fore wings thickly dusted with yellow scales. The submarginal black band on both wings also much dusted yellow.* Beneath, *the base of cell on fore wings is always gray-yellow; the nerves and branches of both wings are lightly edged with black; the submarginal band is largely covered with yellow scales, and the blue on hind wings is azure. The abdomen on ventral side is*

yellow, with a thin ventral line; another such line, subventral, on the last three or four segments; *the ventral line forks as it nears the thorax, leaving a yellow space between the forks.*

The female has the base of fore wing as thickly dusted, perhaps more so; the submarginal band more dusted. Beneath, like the male; the cell nearly solid yellow, there being two black bars, one about middle, the other half way between this and the arc. The ventral side of abdomen is either marked by two fine black lines, or these are wholly wanting; on the side a narrow stripe.

1. A male, so-called *Oregonia*, bred from eggs laid by a female *Bairdii, is very black above*, a thin dusting of yellow scales at base of fore wing scarcely detracting from the general blackness; and the submarginal band is free from yellow scales. On the under side *the cell from arc to base is black, except for a narrow transverse bar just inside the arc*, and another at two-fifths the distance from arc to base. *The nervures on both wings heavily edged with black; the blue not azure, but dark* (*as in Bairdii*). *The lines of black on abdomen are stripes rather*, and *next the thorax are diffused, making a broad black area.*

2. A male, so-called *Oregonia*, bred from egg laid by a female of same type. This is blacker than No. 1, the yellow dusting more scanty. *On under side the cell solid black*, excepting the two yellow cross-bars at and near the arc; *the nerves and branches heavily edged with black;* the *blue dark;* the *black stripes of abdomen confluent next thorax.*

In a female corresponding to No. 2, the ventral side of the abdomen is nearly solid black; in one corresponding to No. 1, the four stripes are heavy, but not quite confluent.

The above description answers for all the examples of so-called *Oregonia* which I have bred from either same type of female or from *Bairaii.* But I have a female nearer the true type *Oregonia* that Mr. Bruce bred from egg laid by *Bairdii*, 1892, and which came out of pupa in March, 1893; spoken of in CAN. ENT., XXV., 254. This has the base of fore wing and the submarginal band much dusted yellow; the base of cell beneath, gray-yellow, ending near middle of the cell in rays, and altogether as in typical *Oregonia;* the nerves and branches lightly edged black; the submarginal band on fore wings densely dusted, making it a yellow band rather; and the blue is azure. This is the nearest example to true *Oregonia* of all the bred hybrids which I have seen.

Besides the hybrid varieties above mentioned is another that is very close to *Zolicaon*. One such example (male), out of egg of *Bairdii*, is of small size, very black above, slight dusting of yellow at base of fore wings, none on the submarginal band. Beneath the cell as in typical *Zolicaon;* that is, solid black, except the two yellow bars at and near the arc; the nervures rather heavily edged black; the blue, dark; and *much deep orange* on hind wings in all the interspaces next the black of the submarginal band, and also orange on the marginal lunules. The ventral side of abdomen solid black, by the widening of the two ventral lines so as to be confluent throughout, and the widening of the lateral stripes; next thorax the four stripes making that part of the abdomen altogether black, as in *Zolicaon*. This example has the anal black spot of *Oregonia* and *Bairdii;* that is, a pear-shaped spot, attached to the black edge of the inner margin of wing; whereas the spot in true *Zolicaon* is round, unattached. But that sort of spot appears sometimes in both true *Oregonia* and *Bairdii*, though it is rare. Except for that anal spot it would be hard to say wherein this male differs from a *Zolicaon*. Mr. Bruce has this season had a specimen come from these Glenwood pupæ that, he says, had he taken it on the wing he should have called *Zolicaon*.

From what I have said, it must be evident that the so-called *Oregonia* of Glenwood Springs is not the real article, not true *Oregonia*. It is more black, less dusted yellow (on both sides); the cell of under fore wings black (an important character); the veins beneath all more heavily edged with black; the blue, dark instead of azure; the abdomen rather black than yellow on the ventral side. That is not *Oregonia*, but a distinct type of butterfly, which, if it had been brought in from Arizona by the Wheeler Expedition, would have been pronounced a species. It may be supposed that it originated in the mating of true *Oregonia* with true *Bairdii*, at some period in the past. Whether these two species, pure type, now mingle in that region, I can not say, because I have not seen a pure *Oregonia* which was taken there. As to *Bairdii*, it varies so much, even where no *Oregonias* fly, and where there is no suggestion of intermixture, that we cannot say what the pure form is. These butterflies, as they now appear at Glenwood Springs, may have begun their career as hybrids, fifty, or one hundred and fifty, or five hundred years ago—no one can guess when; there has been evolved a distinct form, allied to *Oregonia*. It never will do for such a form to be flying without name, and I call it Papilio *BRUCEI*, and

pass it in to the next generation of lepidopterists. The so-called *Bairdii* are also not true *Bairdii*, but at present it is impossible to fix upon their type, because no two of them have been found alike. I may yet figure these butterflies, but it would take half-a-dozen plates to do them justice.

The larvæ from eggs of the *Bairdii*, as well as those from eggs of the so-called *Oregonia*, were of the *Asterias* pattern; in the first three stages, black, or brown-black, with white saddle-patch on 7, 8, 9, and dots and small spots of white irregularly placed on dorsum or upper part of side, no two individuals being quite alike in this respect. After third moult, green, with a black band across the middle of each segment, in which are set rounded yellow or orange spots; the junctions of the segments also black. The green of *Oregonia* after fourth moult was bright yellow-green, the black bands narrow, the spots a rich chrome. Of *Bairdii*, a much darker green, the black bands wider, the spots pale yellow. Yet, on looking over a large number of the larvæ of each form, some of the *Bairdii* were as brilliant as the others, and in all points were like them. This might be expected of hybrid larvæ. As to the pupæ, I could see no difference in shape, and all were in general as in the *Asterias* group.

Eggs of so-called *Oregonia* laid 5th July, hatched 10th. The first moult was passed 14th and 15th; the second, 19th and 20th; the first to pass third was on 23rd; to pass fourth, 30th July; the first pupa, 9th of August; the first imago, 22nd August.

Length of the egg stage, 5 days.
Length of first larval stage, 4 days.
Length of second larval stage, 5 days.
Length of third larval stage, 4 days.
Length of fourth larval stage, 7 days.
Length of pupa stage, 13 days.
From laying of egg to imago, 38 days.

Eggs of *Bairdii* laid 8th July, hatched 12th. The first moult was passed 17th; the second, 23rd; the third, 27th; the fourth, August 2nd; pupation, 12th August. The first imago, 31st August.

Length of egg stage, 4 days.
Length of first larval stage, 5 days.
Length of second larval stage, 6 days.
Length of third larval stage, 4 days.
Length of fourth larval stage, 6 days.
Length of pupa stage, 19 days.
From laying of egg to imago, 44 days.

It becomes of importance to know the distribution of *P. Bairdii* and *Oregonia*, as well as the hybrid, *P. Brucei*. I have never seen an *Oregonia* from Arizona, but have received many *Bairdii* from that territory: some from the Wheeler expeditions, some from Mr. Morrison's catch. On the other hand, *Oregonia* flies in British Columbia, east of the Cascade Range, and perhaps in other districts. Dr. Hagen and Mr. Stretch took it in Washington in 1882; and the Doctor wrote a long paper which appeared in Papilio II., p. 149, in which he took the ground that *Zolicaon* and *Oregonia* were forms of *Machaon*, "not to be separated." He says nothing of having seen *Bairdii*, but, on page 160, says: "It is probable that *Brevicauda*, *Bairdii*, *Indra*, *Pergamus*, and probably *Americus*, all belong to *P. Asterias*." The Doctor's views of what constituted a species were somewhat hazy about that time. But we may conclude that he did not see *Bairdii* in Washington, or he would have expressly said so in his paper.

The only locality that I have been able, by correspondence, to discover, where *Bairdii* and *Oregonia* have both been found, is in Squaw Canon, Sioux Co., Nebraska. Prof. H. G. Barber, of the Univ. of Nebraska, at Lincoln, writes me that an *Oregonia* was taken in Squaw Canon in 1893, and an example of *Bairdii* in July, 1892; in different years, it will be noticed. Another specimen of *Oregonia*, Mr. Barber says, was taken on Lodge Pole Creek, in S.-E. Wyoming, in 1893; but no *Bairdii*. Prof. C. V. Piper, of the Washington Agr. College, at Pullman, Wash., sent me several typical *Oregonia* taken there and in the near-by district in Idaho; but he had seen no *Bairdii*.

(Nothing surprised me more than seeing our Eastern robin, *T. migratorius*, hopping about the lawn at Glenwood Springs, and I learned from Mr. Bruce that it is common throughout Colorado: on the high peaks even, above timber; where it nests in the crevices of the rocks. But if anywhere on those heights a miner's cabin is built, the robins come, and always keep about it.)

SUPPLEMENTARY.

After the foregoing paper went to printer, I received from Mr. Bruce a statement of the results obtained thus far from the pupæ of so-called *Oregonia* and *Bairdii* in his charge, and before spoken of. Thus:

1. *Oregonia* pupæ gave—

1. In fall of 1894, 5 *Bairdii:* 4 ♂, 1 ♀.

2 *Oregonia:* 1 ♂, 1 ♀.

2. In spring of 1895, 9 *Bairdii:* 6 ♂, 3 ♀.
7 *Oregonia:* 4 ♂, 3 ♀.

2. *Bairdii*, first brood—
1. In fall of 1894, 7 *Bairdii*: 5 ♂, 2 ♀.
2 *Oregonia:* 2 ♀.
2. In spring of 1895, 8 *Bairdii:* 6 ♂, 2 ♀.
4 *Oregonia:* 4 ♀.

3. *Bairdii*, second brood—
1. In fall of 1894, 3 *Bairdii:* 3 ♀.
1 *Oregonia:* 1 ♂.
1. In spring of 1895, 5 *Bairdii:* 3 ♂, 2 ♀.
4 *Oregonia*: 2 ♂, 2 ♀.

From *Oregonia*, fall and spring: 9 *Oregonia*, 14 *Bairdii*.
" *Bairdii*, " " 11 " 23 ".

Total: *Oregonia*, 20; *Bairdii*, 37. *Oregonia* being to *Bairdii* as 1 to 1.85. More *Oregonia* in proportion than came from the three broods I had.

It appears that each of the six broods described, 2 of *Oregonia*, 4 of *Bairdii*, gave examples of imago of its own form, and also of the other form.

Neither Mr. Bruce nor myself have obtained a *Hollandii*, and the true position of that form remains to be determined hereafter.

NOTES ON SOME SOUTHERN LEPIDOPTERA.

BY HARRISON G. DYAR, A. M.

Suborder FRENATÆ, Superfamily Microlepidoptera.

Family PSYCHIDÆ.

Oiketicus Townsendi, Cockerell.

1893—Dyar, Ent. News, IV., 321 note. (No name.)

1894—Dyar, Ann. N. Y. Acad. Sci., VIII., 205 (fig. of larval setæ).

1895—Cockerell, Bull. 15, New Mex. Agr. Ex. Sta., pl. fig. 7, 7a.

1895—Cockerell, Ann. Mag. Nat. Hist., (6) XV., 208.

Venation.—Primaries—Vein 1 (IX.) twice angled, branch to margin (XI.), branch to 1c (VIII.), which is faint toward base; median (cubitus) 4-branched, 4–5 (v_2, v_3) stalked; 6 (v_1) from cross-vein, the false discal (media) joining 7 (III_5) just below apex; 8–9 (III_3, III_4) stalked, 10 (III_1) from cell,* 11 (II.) from base.

*The fore wing has 11 veins, vein III_2 being absent. *T. ephemeræformis* has also 11 veins, but it is v_2 which is absent; *O. Abbotii* has all 12 veins present.

Secondaries.—Three internal veins. Median (cubitus) 4-branched; 4–5 (v_{2}, v_{3}) stalked; 6 (v_{1}) above angle of cell; 7 (III.) from cross-vein joining end of cell with 8 (II.); false discal (media) furcate; frenulum large. Wing shape nearer Thyridopteryx than Oiketicus, but colour of the latter. Primaries less drawn out at apex; secondaries less pointed than in *O. Abbotii*. Larval case built on the type of *Thyridopteryx*.

Colour umber-brown (Ridgway III. 14), paler than *Abbotii*; secondaries scarcely tinged with smoky outwardly; body a little darker than the wings. Primaries brown, palest in the area below the cell, the terminal portion between end of cell and margin a shade darker. A vitreous bar at the end of the cell covering the cross-vein as in *O. Abbotii*. A blackish-brown shade fills the cell and obtains slightly in the interspace between veins 6–8 just beyond the vitreous bar and in an oblique shade from lower corner of cell, directed towards anal angle. A black shade below vein 1 at base, extending as far as the branch to the margin. Subcostal and median veins less closely approximated than in *O. Abbotii*, so that the blackish space is more pointedly triangular and extends narrowly to base. Below all brown, the vitreous space only showing. Expanse, 36.5 mm; length, 20 mm.

O. Townsendi is nearer the genus Thyridopteryx than Oiketicus, though not structurally identical with either.

Family MEGALOPYGIDÆ.

Specimens of the species figured by Stoll as Amanda were received from Colombia under the generic term Artace. In Kirby's catalogue it stands as *Dryocampa* (?) *amanda*, following Walker. Even a casual examination is sufficient to show that it does not belong to either of these genera, and, indeed, to neither the Lasiocampidæ nor the Citheroniidæ. A glance at the accompanying figure of the venation will show that the moth belongs to the group of the more specialized Microlepidoptera, and I am in doubt whether to refer it to the Eucleidæ (Limacodidæ) or to the Megalopygidæ. The Megalopygidæ are essentially Eucleids with hairy larvæ, or, rather, the Eucleidæ are the more specialized type which have lost the larval hairs. In the absence of any knowledge of the larva of *amanda*, I am in doubt as to its position. I have separated these families by the characters of their antennæ; this applies to the North American species only, and fails when we consider the Eucleidæ of the world. Therefore I have at present no positive diagnostic character to separate the imagines of these families.

I venture to propose a new generic term for this species, to be provisionally referred to the Megalopygidæ.

Brachycodion, n. gen.

Male antennæ broadly pectinate for less than basal half, the rest short serrate; of female, simple. Head sunken, eyes large, palpi short, porrect, not reaching the front; legs subequal, the tibiæ slightly shorter than the femora, the tarsi very slightly longer than the femora, smooth; no epiphysis; anterior tibiæ unarmed, the middle and posterior with a pair of very short apical spurs. Venation as in the figures. [Venation of *Brachycodion amanda*, Stoll. Rt. = retinaculum of the frenulum in ♂. Figs. 21 and 22.]

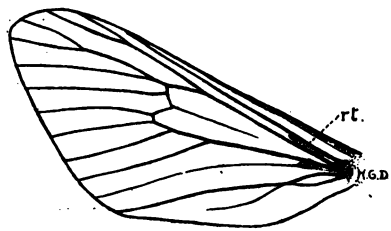


FIG. 21.

Retinaculum of the frenulum in male a long fold from vein 12 and a shorter reversed one from vein 1c; in female, only the latter fold; frenulum well-developed. Body robust, the thorax in width almost equalling one-third of the length of the costa, as long as wide; clothed with dense, short, suberect scaly hairs. Abdomen exceeding secondaries in male, scarcely so in female. The wing scales are spatulate with evenly-rounded ends or rounded triangular, conspicuously striate, on the secondaries produced into long hairs.

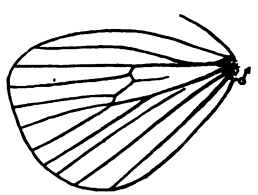


FIG. 22.

The following synopsis of genera has been revised and enlarged from that which I have previously given :—

Vein 7 arising nearer base than vein 9.

Vein 10 on a stalk with 11; male antennæ pectinate at base .... *Brachycodion.*

Vein 10 on a stalk with 7–9; male antennæ pectinate to tip. *Eupoeya.*

Vein 7 arising beyond 9.

Veins 3–4 of secondaries stalked or from same point..... *Carama.*

Veins 3–4 of secondaries not stalked, separate.

Veins 4–5 of primaries short stalked..... *Mesocia.*

These veins not stalked.

Vein 8 of secondaries united to 7 to outer third of cell or less.

Large species; primaries produced..... *Podalia.*

Small species ; primaries rounded..... *Ochrosoma.*

Vein 8 united to 7 nearly to tip of cell.

Female vein 10 of primaries on stalk with 7–9 ; frenulum distinct..... .....*Sciathos.*

Female vein 10 from cell ; male short stalked ; frenulum rudimentary..... .....*Megalopyge.*

As indicated above, I find that *Megalopyge orsilochus* is not congeneric with the other species, and Walker's name may be restored for it. The moth is less modified than Megalopyge ; the male frenulum is distinct, and on primaries the costal loop is very well-developed. In Megalopyge proper it has disappeared. While Megalopyge has one or two branches from vein 1 on primaries, Podalia has three such, having developed supplementary veins for the strengthening of the internal margin.

Prof. Comstock has interpreted the single branch of vein 1, found in our species of Megalopyge, to be the remains of the first internal vein ;* but in *M. lanata*, male, this vein is forked, and it seems scarcely clear whether the whole structure may not be a neomorph. It is rather characteristic of the Megalopygidæ to have this structure, though in the female of Sciathos it is a mere rudiment and it is absent in Eupoeya.†

Family EUCLEIDÆ.

The genus Euryda H.-S. contains in Kirby's catalogue three species. One of these, *leucostigma*, Sepp, is referred, in the appendix, to the Arctiidæ, where it evidently belongs ; another, *lohor*, Moore, belongs to the genus Belippa, according to Hampson ; and we have left only the type *hipparchia*, Cramer. I have both sexes of this species before me. It belongs to the genus Phobetron. Stoll figures the larva, and it is not to be distinguished from our *P. pithecium.*

I think it will be preferable to refer *Limacodes Beutenmuelleri*, Hy. Edw., also to this genus. In placing it in Semyra I followed Kirby, and I have not seen the type of Semyra in nature. Walker's description of the type (*S. coarctata*) implies a species allied to Euclea and Sibine, and can scarcely be near Phobetron, from which *Beutenmuelleri* does not differ essentially.

*Evolution and Taxonomy, Wilder Quarter Century Book, p. 81.

†Until the larva of Eupoeya is known, we can not be sure that it does not belong to the Eucleidæ.

Genus PHOBETRON, Hubn. (= Ecnomidia, Westw., = Euryda, H.-S.).

1 *P. pithecium*, A. & S. (= *abbotana*, Hubn., = *nigricans*, Pack., = *hyalinum*, Walsh, = *tetradactylus*, Walsh).

2 *P. hipparchia*, Cram. (= *violaris*, H.-S).

3 *P. Beutenmuelleri*, Hy. Edw.

Synopsis of differences.

Primaries of female without a distinct ocherous patch at apex; t. p. line regularly dentate; wings of male largely hyaline...*pithecium.*

Primaries of female with an ocherous patch at apex; t. p. line obscure.

Expanse of female, 30 mm. or more; secondaries with reddish tinge; ocherous patches on primaries distinct; male darker, with a hyaline patch on wings.....*hipparchia.*

Expanse of female, 25 mm.; more fragile; secondaries without reddish tint; the ocherous spots on primaries smaller and less distinct.....*Beutenmuelleri.*

SUPERFAMILY NOCTUINA.

Family LASIOCAMPIDÆ.

Tolype brevicrista, n. sp.

This species seems not to be referred to in the Biologia Centrali Americana, nor in the subsequent writings of Mr. Druce or Mr. Schaus, so far as I am aware.

Types: A male in my collection probably from Mexico; one from Mr. T. D. A. Cockerell, Las Cruces, New Mexico (R. R. Larkin). Also a specimen in the Edwards collection labelled Arizona.

Male.—White; eyes bordered with blackish; abdomen faintly banded with pale gray. On thorax, posteriorly, a small median tuft of metallic blue-black flattened spatulate hairs, not curled, and not extending forward to middle of thorax. Wings white, the primaries crossed by seven gray, or blackish-gray, bands, in the pattern of *Tolype velleda.* The three basal, narrow, rather faint; fourth beyond end of cell touching third at inner margin, and approximate to it on costa but remote centrally, angulated outward on veins 4 and 8; beyond this three more bands, the last terminal, broad, separated by narrow white spaces; the fifth and sixth almost united in the dark N. M. specimen, well separated in mine; outer edge of sixth band a little irregular on the veins. Fringe and veins white. Below, the markings are faintly repeated, but washed with white. Pectinations of antennæ brown.

In my specimen the third band is partly obsolete, and all are fainter and paler than in the N. M. example; the white spaces are wider, so that the third and fourth bands are not approximate at either costa or margin.

Expanse, 32.5 mm.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIII. The Cleridæ of Ontario and Quebec.

The Cleridæ are a rather small family of beetles, but make up for their comparative scarcity by the beauty of form and colour shown by many of them. As a rule, they may be easily recognized by their resemblance to a few common types such as are found in all cabinets, and agree in possessing the following family characteristics: The antennæ are usually serrate, with the outer joints enlarged, forming an open or more rarely a compact club; the tarsi are five-jointed, the first or fourth joint often very small and indistinct, all but the fifth furnished with membranous appendages. The ventral segments are free, the first not elongate, and the hind coxæ are flat. In habits they are diverse, but most of them may be found in the perfect state, during the summer months, on flowers, leaves or freshly-cut timber, while *Necrobia* lives about dry carrion, and may even at times do a certain amount of damage in museums by preying upon dry specimens of various sorts, since the species are easily carried from place to place, like *Anthrenus*. In this way they were introduced from Florida into the museum of the University of Iowa, and have continued to breed there in small numbers. The larvæ of *Trichodes*, *Clerus*, and allied genera are said to feed on the young of other insects, and to be found in the nests of bees or under bark of trees infested by wood-boring larvæ of various sorts.

A great many species of *Cymatodera* and allied forms do not extend into high northern latitudes, and we find in consequence that the Canadian fauna does not show a very good representation in the family, only a little over thirty having been reported from the region under consideration. These are included in thirteen genera which may be separated by the following table. Care must be taken in the study of the tarsi, though after a little practice a specimen can usually be placed in its proper position without much trouble:—

A. Tarsi with fourth joint about equal to third, flanks of thorax continuous with disk. Middle coxæ moderately distant (except in *Hydnocera*).

b. Tarsi distinctly 5-jointed, first joint not shorter than second; antennæ 11-jointed, serrate; eyes coarsely granulate. *Cymatodera.*

bb. Tarsi apparently 4-jointed, the first joint small, usually visible only from below.

c. Eyes moderate in size and emarginate in front.

d. Antennæ serrate, eyes strongly granulated..... *Priocera.*

dd. Antennæ usually distinctly clavate, eyes finely granulated.

e. Last joint of maxillary palpi broader than the preceding; thorax and legs blue, shining; elytra blue or violet with red bands or the reverse..... *Trichodes.*

ee. Last joint of maxillary palpi slender.

Posterior tarsi rather broadly dilated..... *Clerus.*

Posterior tarsi longer and slender..... *Thanasimus.*

cc. Eyes not emarginate, often very large and prominent.

Antennæ stout, club 3-jointed, not abrupt... *Thaneroclerus.*

Antennæ slender, club sub-globose..... *Hydnocera.*

AA. Tarsi with the fourth joint very small, forming merely an enlargement at the base of the fifth; flanks of prothorax separated from the disk (except in *Ichnea*) by a more or less distinctly elevated margin. Middle coxæ contiguous or slightly separate.

f. Antennæ with outer joints flattened, and triangular or inwardly prolonged.

g. Eyes with an internal emargination.

Club of antennæ 3-jointed, not longer than the other portion..... *Phyllobænus.*

Club 3-jointed, each joint as long as basal portion... *Ichnea.*

gg. Eyes with a frontal emargination.

First joint of tarsus equal to second, anterior tibiæ serrate externally..... *Chariessa.*

First joint of tarsus small, inferior; eyes coarsely granulate ..... *Orthopleura.*

ff. Antennæ with a small compact club.

Smaller; above reddish to blackish..... *Laricobius.*

Larger; above bright blue, with or without reddish markings..... *Necrobia.*

CYMATODERA, Gray.

The two Canadian species are of elongate form and readily distinguished thus:—

Black, thorax yellow, basal and apical margins black; femora at basal half and two basal joints of antennæ yellow. .30–.36 in. ..... *bicolor*, Say.

Brownish or piceous, antennæ ferruginous, legs brownish, the coxæ and tarsi paler. .30–.36 in. ..... *inornata*, Say.

PRIOCERA, Lec.

The only species is *P. castanea*, Newm., known by the generic characters. In colour it is rufous, shining, with long, sparse pubescence. Each elytron with two yellow spots near the middle, and a broad black band. Occasionally there is an additional small yellow spot at base. The feet are piceous. .25–.40 in.

TRICHODES, Hbst.

These are very pretty blue or black insects, banded with red or yellow, found on flowers, especially Umbelliferæ, during the summer. The two Canadian species separate easily thus:—

Fig. 17.

Elytra rather finely punctate, bluish, with basal, median and subapical red or yellow bands. .40 in. (fig. 17). ..... *Nuttalli*, Kirby.

Elytra coarsely deeply punctured, red with two transverse bands and tip black. .46–.60 in. ..... *apivorus*, Germ.

The figure of *T. Nuttalli* is made from a specimen showing rather less red than usual, the extent of this colour being quite variable. In the Western Provinces it is replaced by *T. ornatus*, Say, a still more variable species, in which the middle band is always more oblique than in Nuttalli; anterior to this band is usually found a very distinct red or yellow subsutural spot on each elytron.

CLERUS, Geoffr.

Several species of this genus vary so much in colour as to make their recognition from description rather difficult. The abdomen, for example, may be (in *quadriguttatus*) either rufous or black, and in some others the elytral ornamentation varies greatly. They may be found about flowers or on freshly-cut timber, resorting to the latter probably for the purpose of egg-laying, since the larvæ prey on those of wood-boring insects. The Canadian forms separate thus, though intermediate patterns of coloration, which I have not seen, may perhaps occur:—

A. Elytra broadly rufous at base, head and thorax rufous, varying rarely to blackish. Elytra with transverse black and cinereous bands. .20–.28 in.. ..... *quadriguttatus*, Oliv.

AA. Elytra at base black or only narrowly rufous.

Thorax and head rufous; elytra with basal or subbasal, postmedian and apical band black, subapical band cinereous. .42 in. (fig. 18)..... *ichneumoneus*, Fabr.

Fig. 18.

Thorax rufous, with a large baso-median black spot; head and elytra black. .20–.27 in..... *thoracicus*, Oliv.

Thorax, head and elytra black; the last with three cinereous bands, of which the posterior is widest, and apical or subapical in position. .27–35 in. *nigriventris*, Lec.

Near the Pacific Coast we find also *C. sphegeus*, Fabr., which is about the colour above of *C. nigriventris*, but larger (.34 in.), and the abdomen is red, while the elytra have a very wide median and small apical cinereous band.

THANASIMUS, Latr.

The character given for the separation of this genus from *Clerus* is not very evident, and most reliance must be placed on the specific descriptions, which have been made moderately full. There is the same tendency to colour-variation as in most other genera in this family. The characters of the Canadian forms are as follows:—

Elytra rufous, with broad median band and tip black, intermediate band cinereous. Feet black. .39–.51 in. ..... *trifasciatus*, Say.

Elytra rufous at base, dark posteriorly with two cinereous or whitish fasciæ; beneath rufous. .34 in..... *dubius*, Fabr.

Elytra black, very narrowly rufous at base, with two cinereous bands, of which the anterior is shaped like a W and narrower than the posterior, which is not undulated; thorax reddish, anterior margin piceous, post-pectus black at middle. .20–.30 in..... *undatulus*, Say.

Elytra black with two undulate cinereous fasciæ, the posterior broader; thorax black, abdomen and feet rufous. .30–.38 in.. *nubilus*, Klug.

Elytra black, the suture anteriorly cinereous, and two bands of the same colour; the posterior broader, outer row of punctures extending beyond the middle; abdomen sanguineous, thorax and legs black. .30 in..... *rubriventris*, Lec.

Of the above, *rubriventris* is considered a variety of *dubius*, and *nubilus*, in a like manner, of *undatulus*. Some allowance must be made for colour variation, but, as a rule, specimens may be easily assigned to their proper places by the table.

THANEROCLERUS, Spin.

T. sanguineus, Say, is easily recognized among the Canadian species of this family by its colour, the head and thorax being obscure brownish, while the elytra are sanguineous. Length about .20 in.

HYDNOCERA, Newm.

Smaller and more slender insects than most of the other Cleridæ, found commonly on foliage, and easily obtained by beating or sweeping. The eyes are very large and prominent, as in *Cicindela* and *Stenus*, to which latter genus a few of them bear, at first sight, considerable resemblance. Some species have the elytra much shorter than the abdomen. Ordinarily well-marked specimens may be identified by the following table :—

A. Thorax not or only slightly longer than broad.

b. Punctuation of elytra confused.

Thorax with subacute lateral dilatation ; elytra blackish with a narrow yellowish median fascia. .17 in.. ..*unifasciata*, Say.

Thorax hardly acutely dilated at sides; elytra with the humerus usually broadly rufous, varying to entirely black ; legs black or rufous. .17–.20 in.....*humeralis*, Say.

Thorax with rounded lateral dilatation and profound anterior impression ; anterior legs testaceous. .20 in.....var. *cyanescens*, Lec.

bb. Punctuation of elytra distinct, the individual punctures evident.

Fig. 19

Blackish-blue, polished, elytra without testaceous markings, legs black, tibiæ and tarsi sometimes more or less testaceous. .10 in.....var. *difficilis*, Lec.

Black, antennæ and feet pale, elytra pale with the margin, apex, suture and median fascia black (these markings variously reduced). .17 in. (fig. 19).....*pallipennis*, Say.

AA. Thorax distinctly longer than broad, elytra shorter than the abdomen, legs much elongate. Blackish species, base of elytra sometimes testaceous.

Thorax twice as long as broad, elytra slightly shorter than the abdomen. .19–.25 in.....*tabida*, Lec.

Thorax one-half longer than broad, elytra much shorter than the abdomen. .11 in..... ...*longicollis*, Ziegl.

Of the above, both *cyanescens* and *difficilis* are considered varieties of *humeralis*, though, owing to the difference in sculpture, one of them is placed in a different division of the table from the others. The genus needs careful revision in the light of more material than is at my command.

PHYLLOBÆNUS, Spin.

Contains a rather small species, *P. dislocatus*, Say (.11–.17 in.), of a black colour and elongate form, the last three joints of the antennæ compressed, sub-triangular. The elytra are very coarsely punctured in rows, and ordinarily ornamented with a curved sub-basal and undulate median band of yellow, and an apical spot of the same colour. Either the first or last may be absent or the median one alone remain.

ICHNEA, Lap.

Represented in Canada by *I. laticornis*, Say, about .24 in. long, black, linear, the head vittate with yellow, thorax margined with the same colour, elytra with striæ of large punctures, the apical ones confused.

CHARIESSA, Perty.

C. pilosa, Forst, is a beautiful velvety-black insect about .50 in. long, the thorax roseate with two broad black discal lines, usually confluent behind. The variety *onusta*, Say, (fig. 20) has these lines reduced or wanting, and the elytra margined with yellow.

Fig. 20

ORTHOPLEURA, Spin.

O. damicornis, Fabr., is black, thickly punctured, pilose, the thorax reddish. It varies in length from .25 to .38 in. The antennæ have the usual broadly dilated, compressed club of this group.

LARICOBIUS, Rosenh.

Of this genus, *L. Erichsoni*, found also in Europe, is the only Canadian species. It is a small brown insect about .10 in. long, with short black hairs, while the elytra are marked with rows of large quadrate punctures.

NECROBIA, Latr.

As the name indicates, the species are found about carrion, especially that which is in a dried state, and they form one of the most efficient scavengers on the Western plains. In colour they are blue, more or less polished, and sometimes marked with red. They easily separate thus :—

Thorax and base of elytra red (.21 in.).....*ruficollis*, Fabr.
Thorax and elytra blue.
Legs reddish (.21–.25 in.).....*rufipes*, Fabr.
Legs blue or blackish (.17–.21 in.).....*violacea*, Linn.

Most of the papers treating of the North American Cleridæ are sadly out of date, and, in addition, very difficult or expensive to obtain. The list of titles following gives the chief of those that will aid the student :—

1841. Klug, J. C. F., Versuch einer systematischen Bestimmung und Auseinandersetzung der Gattungen und Arten der Clerii. Abh. d. Konigl. Akad. der Wissensch. zu Berlin, pp. 259–397, 2 pl.
1844. Spinola, M. Essai monographique sur les Clérites. Gênes, 2 vols., pp. 386 and 226, 47 pl.
1849. Leconte, J. L. Synopsis of the Coleopterous Insects of the group Cleridæ which inhabit the United States. Ann. N. Y. Lyc., V., pp. 9–35.
1876. Horn, Geo. H. Synopsis of the species of Cymatodera and Trichodes of the United States. Trans. Am. Ent. Soc., V., pp. 220–232.

MISCELLANEOUS NOTES ON COCCIDÆ.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

(i.) *Lecanium*, sect. *Eulecanium*.

(1) *Lecanium caryæ*, Fitch, var. *canadense*, v. nov.

♀ scale smooth, shiny, red-brown, convex, malleate, but not or hardly plicate. Length 4, breadth 3, height 2 mm., varying to length 5, breadth 4, height 3 mm. (Some Maine specimens 6 mm. long.) Removed from the twigs, the scales leave an oval white mark. (Nappan scales are paler and more yellowish, also somewhat smaller. Posterior incision perhaps a little longer ; scales also rather more tending to be plicate.)

♂ scale ordinary, rugulose.

♀ with 6-jointed antennæ, formula 326154 ; 3 considerably longer than the remaining joints put together ; 1 with 2 hairs ; 2 with 2 hairs at its end, one especially long ; 3 with 2 hairs near its end ; last joint with several hairs, one especially long. (Nappan antennæ practically the same, but 1 larger ; 4 and 5 each show a hair ; 6 hardly so long, formula 3 (126) 54. Maine antennæ show one long hair at end of 3, 2 with one very long hair ; 2 a little longer than 4 ; 4 a very little longer than 5 ; 6 a little longer than 2 ; formula 36245.) Derm obscurely tessellated, with large gland-pits. (In Maine specimens gland-pits frequently in pairs.)

Femur not much longer than tibia. Tarsus hardly ⅓ shorter than tibia; distinctly swollen at base. Claw rather stout, curved at its tip like a falcon's beak. Digitules of tarsus apparently wanting (deciduous?). Digitules of claw large and distinct, extending well beyond tip of claw, stem moderately stout, knob large and oval. A bristle on end of coxa, one on end of femur, and one on end of tibia. (Nappan scales show legs much the same, but femur proportionately longer, tarsus only a little swollen at base; tarsal digitules well-developed, long, ordinary; digitules of claw short, not extending to end of claw; claw stout, nearly straight, not hooked. Maine examples show coxa stout, broader at base than its length, with a hair at its tip; trochanter with a long hair; femur longer than tibia, tarsus about ⅓ shorter than tibia; digitules all filiform.)

Eggs (Maine specimens) very pale pinkish.

Hab.: The types are from Stittsville, about 20 miles from Ottawa, on *Ulmus racemosa*, sent by Mr. Fletcher. Other specimens are from Nappan, Nova Scotia, on elm (Fletcher), and Orono, Maine, on elm (Harvey). Prof. F. L. Harvey states that it is very abundant at Orono; he has known it for eight years, and it is increasing. The branches are often almost covered with them.

The Stittsville examples are affected by a Coccinellid, and by an Encyrtid parasite, perhaps a *Chiloneurus*.

The species is quite different from the European *Lecanium ulmi*, and is doubtless a native of this country. It illustrates well the extreme difficulty of dealing with the American species of *Eulecanium*, which have, perhaps, not succeeded in reaching a condition of specific equilibrium since the new developments which doubtless followed the termination of the glacial epoch. It will be seen from the above that the characters given are quite variable, unless we are dealing with three species instead of one—a view which I cannot for a moment entertain. While thus convinced that all these elm forms are strictly one thing, I have a very lively conviction that *L. ribis*, Fitch, is different—a conviction which I feel sure would be shared by any one who had seen quantities of both—yet it is difficult to point out the precise nature of the difference, apart from the smaller size of *ribis*. Two species of Fitch, *L. cynosbati* and *L. caryæ*, have been redescribed by Signoret, who shows that they have 6-jointed antennæ like *ribis* and *canadense*. I have not seen authentic examples of either, but the description of *L. caryæ* agrees so nearly with our elm species that I place the latter under it as a variety.

(2) *Lecanium ribis*, Fitch.

This species may be known by its comparatively small size, and 6-jointed antennæ, with the third joint very long. There are two long hairs almost at the end of the third joint.. The derm shows large gland-pits, often in pairs. The insect reminds one of *L. hemisphæricum*, but it is a true *Eulecanium*. It is not confined to *Ribes* by any means. Dr. Lintner sent me specimens found by Hon. G. W. Clinton, on *Ostrya* and *Carpinus*, in Albany Rural Cemetery, June, 1885. These were 3 mm. long, 2 broad, 2¼ high. Just lately, Prof. Webster has sent it plentifully, infesting mulberry in Southern Ohio. The specimens are a little larger than usual, but clearly *ribis*. This attack on mulberry—a tree hitherto very free from insects in this country—is apparently a serious matter, and will doubtless be fully investigated by Prof. Webster. The *L. mori*, Sign., found on mulberry in the Savoy (Europe), is quite different.

(3) *Lecanium Fitchii*, Signoret.

On wild blackberry, Medina County, Northern Ohio, sent by Prof. F. M. Webster. The specimens have 8-jointed antennæ. I think this is the most western locality in which the species has yet been found.

Lecanium quercitronis, Fitch.

Mr. V. H. Lowe sends this on ironwood, but omits to state when it was found. Hitherto it has only been known on oak. The antennæ are 7-jointed. The newly-hatched larva is very pale yellowish, with a pale gray dorsal band.*

Certain forms of *Lecanium* found on oak and rose at Manitou, Colorado (Gillette), and on rose at Santa Fé, N. M., have given me a lot of trouble, and even now I do not know what to call them. It was at first questioned whether the rose species might not be the European *L. rosarum*, introduced, but it now seems tolerably certain that such is not the case.† It was hoped that they could be classified by the antennæ, but the more specimens examined, the greater grew the confusion, owing to the variability observed. Mr. Joseph Bennett, when a student at the N. M. College, examined these forms and found the antennæ thus :—

*Compare the young of *L. Fitchii*. The lately-hatched young of species of *Lecanium* differ more or less in appearance. Thus, the living young of *L. armeniacum*, Craw, sent by Mr. Ehrhorn from Sta. Clara Co., California are pale gray marked with white, with a conspicuous white or yellowish-white dorsal longitudinal band. Miss Tyrell considers *armeniacum* a variety of *pruinosum*, which probably is correct

†It is also quite distinct from *L. pruinosum*, Cog., which Mr. Ehrhorn sends me on rose from Mountain View, California.

(a) On oak, Manitou.. Antennæ 8-jointed, formula 3 (24) 18 (567).
(b) On rose, Santa Fé.. " 8-jointed, " 38 (12) 45 (67).
(c) On rose, Manitou.. " 7-jointed, " 3 (24) (17) (56).

Later, I myself obtained the following results :—

(b) On rose, Santa Fé.. Antennæ 8-jointed, formula 4 (31) (28) (567). Joint 4 was a very little longer than 3.
(a) On oak, Manitou.. Antennæ 7-jointed, formula (34) (21) 7 (56).

I asked Prof. Gillette for more abundant material of the Manitou forms, and he sent them in quantity, but even then I could reach no certain conclusions. It appears, at all events, that the antennæ, *never* 6-jointed as in *ribis* and *canadense*, may have either 7 or 8 joints in the same form. Further, that while the third joint is usually the longest (as in *quercitronis*), 4 may be equal to it or even a little longer. In every instance, 5, 6, 7 are the three shortest, but when there are only 7 joints, 7 will be longer than 5 or 6. The differences seen in the formula given are not so important as might appear, for the slightest change in the length of a joint may alter the formula where several joints are so nearly of one length.

In general appearance, these scales are much alike, and do not differ in any marked degree from *L. quercitronis*. In fact, unsatisfactory as I feel the conclusion to be, I see nothing for it but to call them all *L. quercitronis*, var., at least until further studies of the living insects in all stages can be made. The differences between these *quercitronis* forms and *Fitchii* will also have to be clearly made out. Here again, the antennæ will not assist us. I think *Fitchii* and *quercitronis* must surely be distinct; but to *think* so is not to prove it—and the variability already observed in these forms throws doubt on formerly-accepted marks of distinction. The statements of Mr. Douglas regarding willow and rose species in England are suggestive in this respect.

It is much to be hoped that some of the Eastern and Canadian entomologists will study the biology of these perplexing forms. It is only by such means that we can arrive at sound conclusions. When dried specimens are sent to me, I can point out how they differ, but am left often in doubt as to how far the differences are specific, and how far due to ordinary variability, or even to the direct influence of the environment.

At Las Cruces, one day, I found a small *Eulecanium* on an umbellifer—one specimen only. It looked different from anything I had

seen, and the finding of a *Eulecanium* on an herbaceous plant was contrary to all preconceived ideas! What was I to do?—call it a new species? Close by was a peach tree, on which were a few ordinary *L. persicæ*, and here of course was the explanation. But had I sent the umbellifer scale away to some entomologist, with no information about the adjacent *persicæ*, I really don't see how he could have guessed what it was—the thing was so starved and altered by its unwonted food!

All these remarks will naturally tend to produce the impression—doubtless correct—that we have too many nominal species of *Eulecanium* in the books. But if we must distinguish species with caution, so also must we lump them with caution. It is a stupid way out of the difficulty to throw all those together that we cannot quite easily separate.

(5) *Lecanium robiniarum*, Douglas. In May, 1894, I bred a parasite from scales of this species found on locust in Las Cruces, N. M. Mr. Howard identifies it as *Blastothrix longipennis*, Howard, and states that it has previously been reared from several Lecaniines.

On osage-orange in Las Cruces, I find a scale just like *L. robiniarum*, but perhaps a little more shiny and more decidedly pruinose. But the eggs of the osage-orange form are always pure snow-white, while those of *L. robiniarum* are salmon-pink!

(ii.) *Lecanium*, other sections.

(6) *Lecanium perforatum*, Newstead. A flat species with 8-jointed antennæ, found on palms. Mr. Ehrhorn sent me specimens from a greenhouse in San Francisco. Miss Mary W. Tyrrell, of Oakland, sends me a very pretty enlarged photograph of this insect, which she regards as *L. tessellatum*, Signoret. While I cannot very well doubt that it is Newstead's *L. perforatum*, I must confess that I am not well-satisfied about its distinctness from *tessellatum*. It does not seem, however, to be the same as the Jamaican species on lignum-vitæ, which I had regarded as *tessellatum*, though the two things are very much alike. For the present, no more can be said, though it seems likely that the Jamaican insect will need a new name.

(7) *Lecanium oleæ* (Bern.). Prof. Toumey sends this on orange from Arizona; and Mr. Lataste found specimens in Chile, on *Yucca* in a garden. In both these cases it has of course been introduced.*

*In both cases the names of the exact localities were sent, but I regret that I am totally unable to decipher them. Will correspondents please write names of localities plainly?

(8) *Lecanium hemisphæricum*, Targ. On a house-fern belonging to Mrs. Fred. Lohman, in Las Cruces, N. M., I found this species and *Dactylopius longispinus*, Targ. These Coccids will not live out-of-doors in the climate of Las Cruces, so far as we know.

(9) *Lecanium insignicola*, Craw, emend. Mr. Ehrhorn sends me this, on *Pinus insignis*, from Golden Gate Park, San Francisco. The specimens belong to *Physokermes*, and we must write the species *Physokermes insignicola* (Craw).

(iii.) *Pulvinaria*, section of *P. camellicola.*

(10) *Pulvinaria camellicola*, Sign., *P. urbicola*, Ckll., *P. simulans*, Ckll. These species need some further elucidation. The second is only known on *Capsicum* in Jamaica; the third only in Trinidad. We are supposed to have *P. camellicola* in this country, but I have never seen any with 6-jointed antennæ, as described by Signoret. Here is a short description of our insect:—

♀ remains brownish after boiling in potash. Tarsal digitules distinct and well-formed. Digitules of claw extremely large and stout, very broad at ends. A very long hair on end of trochanter. Marginal spines numerous and long. Lateral (stigmatal) incisions each with three spines, brownish and stout, one large, the other two small. Antennæ 8-jointed: 3 longest; 2, 4 and 8 subequal and next longest; 5 shorter than 4; 6 and 7 equal and shortest; 2 with a very long hair at the end; 3 with a moderately long hair at end; 5 with two very long hairs at end; 7 with a long hair; 8 with many long hairs.

Hab.: Macon, Ga., Apr. 15, 1892, on *Euonymus*. (Div. Ent., No. 5029; received through Dr. Riley.)

Just lately, Prof. Townsend has found the same species in abundance at Brownsville, Texas. The antennæ are 8-jointed, as in the Macon ones, formula 32 (41) (58) 67. The name of the food plant is not known, but it is not camellia, nor capsicum.

Notwithstanding the external similarity (which counts for little in *Pulvinaria*), I do not see how we can reconcile the above with Signoret's account of *camellicola*, assuming the latter to be correct. In 1886 Douglas treated of *camellicola*, and perhaps threw new light on the matter, but I have not now access to his paper.

If we thus assume that our insect is not *camellicola*, is it *urbicola* or *simulans*? Unfortunately, we know these latter only from one locality each, and are not well-informed about their possible range of variation.

In the large digitules of the claw it resembles *simulans;* in the 8-jointed antennæ, *urbicola.* In the ovisac it rather resembles *simulans* than *urbicola;* in fact, its external appearance is practically the same. In *simulans* the fourth joint of the antenna is very short; in our insect it is much longer than 6 or 7, and somewhat longer than 5. This comes nearer to the condition of *urbicola.* All things considered, perhaps it would be best, for the present, to call our insect *P. simulans,* variety. *P. bigeloviæ,* Ckll., is another species of the same group.

(iv.) *Asterolecanium.*

(11) *Asterolecanium pustulans* (Ckll.). On oleander from Honolulu; sent by Mr Ehrhorn. Mr. Maskell has placed this as a synonym of *A. fimbriatum* = *Planchonia fimbriata*; but I have true (French) specimens of the latter, kindly sent by Mr. Howard, and it is a totally different thing. It is hardly necessary for me to say that I cannot in the least agree with Mr. Maskell's proposed synonymy of the species of *Planchonia* or *Asterolecanium.* As several of the rejected species are my own, I do not care to discuss the matter now, but will leave it to the judgment of other coccidologists who may have occasion to examine the several forms. In fact, Mr. Maskell himself (as I hear from him) is giving closer attention to the matter, and will, I doubt not, eventually revise his present classification.

(v.) *Dactylopius,* section without lateral tufts.

(12) *Dactylopius virgatus,* Ckll. This is a destructive species, hitherto only known from Jamaica. Prof. Townsend has just discovered it in numbers on a cactus and other plants at Brownsville, Texas. Fortunately, it is there preyed upon by a *Scymnus* larva and a Chalcidid, which Mr. Howard tells me will form a new genus of Bothriothoracini. In Trinidad, Mr. Urich has found a *Dactylopius* on *Croton,* which I cannot distinguish from *D. virgatus,* var. *farinosus*; although, curiously, it also seems identical with Mr. Newstead's *D. ceriferus,* found on *Croton* in India. If this is so, *ceriferus* falls as a synonym of *virgatus.* No more need be said now, as I believe the subject will hereafter be fully discussed by Messrs. Townsend and Urich.

(vi.) Various *Diaspinæ.*

(13) *Mytilaspis pomorum* (Bouché). In the mountains, at Mountain View, California, on *Cornus californicus.* Sent by Mr. Ehrhorn. The specimens show fewer glands in the groups than some from apple,

viz., caudolaterals, 9; cephalolaterals, 14; median, 8. Mr. Schaufuss sent me *M. pomorum* on *Cornus* from Saxony long ago.

(14) *Diaspis amygdali*, Tryon. (=*lanatus*). This evidently reached California from Japan. Mr. Ehrhorn sends me some on dwarf peach from Japan, in Japanese nursery at San José, California. Also a grayish form of the same on persimmon from Japan, found by Mr. Craw in his quarantine work. The latter form looks different from ordinary *amygdali*, but is clearly that species; it shows caudolateral groups of glands with 36 orifices, cephalolaterals, 43; median, 15. The grayish appearance is partly due to dirt. Mr. Ehrhorn says it also infests dwarf cherry.

(15) *Aulacaspis bromeliæ* (Kerner). On pineapple in conservatory at San José, California (Edw. M. Ehrhorn). The exuviæ are nearly marginal.

(16) *Chionaspis assimilis*, Maskell. Sent by Mr. Ehrhorn. It was found by Mr. Craw on a tree from Australia, in the course of his quarantine work.

(17) *Chionaspis quercus*, Comst. On oaks at Dripping Spring, Organ Mts., N. M., 5,600 ft. (Ckll.). New to New Mexico.

(18) *Ischnaspis filiformis*, Dougl. Trinidad, West Indies. In extraordinary numbers on *Cycas revoluta*. (J. H. Hart.)

(vii.) *Aspidiotus.*

(19) *Aspidiotus juglans-regiæ*, Comst., Southern California, on prune. (Edw. M. Ehrhorn.) This species is quite generally distributed in Las Cruces and Mesilla, N. M., but here always white (var. *albus*). Two days ago I found it in Mesilla on apple, pear and apricot. Nowhere does it increase like *perniciosus*, and it is a comparatively harmless species, though anything but desirable in an orchard.

(20) *Aspidiotus piricola*, Del Guercio. This species, lately described as new from Italy, has turned up on plum at San José, California, specimens having been sent by Mr. Ehrhorn. A mounted specimen is dated March 18, 1892, others 1894; so it has been in California for some time unrecognized. The following description, from Californian examples, is worth giving:—

♀ scale 1½ mm. diam., flattened, circular, pale gray; with the exuviæ covered normally by a thin film of secretion, and then hardly noticeable, but the film very easily rubbed off, when the shiny, orange-brown exuviæ are conspicuously seen.

♀. Median lobes orange-brown, the others colourless. Median lobes large, prominent, well-developed, rounded at ends. The other lobes all very small and rudimentary; 2nd, 3rd, 4th and 5th pairs can be distinguished, becoming successively smaller; 2nd and 3rd very distinctly bifid. Small saccular incisions between the lobes. Five groups of ventral glands; all the groups rounded or oval, compact; median of 8, cephalolaterals, 13, caudolaterals, 8. Anal orifice circular, a little posterior to line of caudolateral groups, and a considerable distance from hind end.

A. ancylus differs by its dark scale, and the position of the anal orifice, &c. It is also clearly distinct from *Howardi*, *ostreæformis* and *juglans-regiæ*.

A. Howardi is still only known from Canon City; the Illinois specimens on cherry (W. G. Johnson), reported as such, prove on examination to be a slight variety of *A. ancylus*.

(21) *Aspidiotus ficus*, Ashm. On *Cocos nucifera* and *Oreodoxa regia*, Iacmel, Hayti, sent by Mr. F. Wolff. New to Hayti.

(22) *Aspidiotus destructor*, Sign. Qn cocoanut, San Juan, Porto Rico. Sent by Mr. J. D. Hall. New to Porto Rico, and the first Coccid-record for that island! It shows the grouped glands well: caudolaterals, 6; cephalolaterals, 10; median, 1 only.

THE BOREAL AMERICAN SPECIES OF PAMPHILA.

BY DR. HENRY SKINNER, PHILADELPHIA, PA.

There seems to be some misapprehension in regard to the validity of our species of *Pamphila*, and inasmuch as I have been studying our Hesperidæ for some years past, I thought some remarks on the subject would not be inappropriate. We now have in this genus ninety-six species as they would appear in a list according to the generally accepted specific values. With the exception of about two groups, I consider the species remarkably well defined and constant, and if you once become thoroughly familiar with them, there is not the slightest difficulty in separating any of them at sight. The great difficulty has been to determine them from descriptions, as the word pictures are often inadequate, and almost impossible to comprehend, as the descriptions seem to fit a number of species that may not be even very closely related. Many of the figures have also been failures to a great extent; this is particularly true of the difficult Comma group, which is in most collections in a condition akin to certain of our species of Argynnis, Melitæa and Colias.

The first group of species of uncertain value is the so-called *comma* group; this is named *comma* group because the species, so-called, resemble or are variations of an European species, *Pamphila comma*. I think it unwise to separate these forms of *comma* and consider them species, as the variation is almost endless, every locality seeming to produce a new one. I have received individuals of this group from Southern Texas to Assiniboia, and how much farther north or south they are found I do not know. Their western limit is the Pacific Ocean, and the eastern limit is perhaps not well-defined, being somewhere in Canada, and as far east as Colorado in the United States. I would limit the *comma* group proper to *Ruricola*, *Oregonia*, *Columbia*, *Colorado*, *Nevada*, *Manitoba*, *Juba*, *Assiniboia*, and any others that people care to name after the special localities where found. The fewer specimens one has of these variations the better off he is in regard to being able to determine them—if he has large series from various localities he is "at sea." I have recently received a form from the mountains of Utah, which some ambitious lepidopterist might like to call *Utahensis*. There is one other group that presents some difficulty, and in which some species do not seem to me to be clearly defined—they are *sylvanoides*, *agricola*, *pratincola*, *milo*, *verus*, *mystes*, *siris*. I do not mean to say that all of these are not valid species, but that some of them seem variable and to run into each other, and some are hard to separate. The remaining species, as a rule, are remarkably distinct and have excellent characters. There is much work to be done in the genus in the way of correcting synonymy, and in a few cases there are actual synonyms, but in comparison to the great number of species the synonyms are few. As an example of the mixed synonymy, the following may be cited :—

Vitellius, Fabricius = *Vitellius*, Hubner = *Delaware*, Edwards.
Arogos, Bdl.-Lec. = *Vitellius*, Abb.-Sm., = *Iowa*, Scudder.

All who have heretofore written on the subject have put *arogos* as a synonym of *cernes*, but Boisduval and Leconte knew *cernes*, which they figure, and also give a recognizable figure of *arogos*, a southern and western species. I hope to monograph the genus some day, and desire all the material I can get. I have all the species, with but few exceptions, and am very anxious to get these, either by purchase or exchange. I have been studying photography and the "half-tone" process, with a view of illustrating these interesting little fellows, but their non-actinic colours of black, yellow, orange, and red make them the most difficult things imaginable to reproduce in this way. I think, however, there is a great future for the illustration of natural history objects by photography.

NOTES UPON THE NORTH AMERICAN SATURNINA, WITH LIST OF THE SPECIES.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Of the three families of *Saturnina* found in North America, only the *Saturnidæ* occurs in the European fauna. Conversely no analogue of the European *Aglia tau* * has been found in America. In a very interesting paper, Ann. Mag. N. Hist., Vol. XI., 1893, Dr. Packard says of this species: "*Aglia* appears to be a Ceratocampid in its earlier larval stages, the caterpillar in its final stage, however, and the moth being closely related to the Saturnians." This being so, it is clear that *Aglia* cannot be classed as a subfamily of *Citheronidæ*, from which the habit and structure of the moth and the mode of pupation seem to exclude it. *Aglia* seems, in fact, a comprehensive type, showing characters of the other three families of *Saturnina*. The head and antennæ are compared by Dr. Packard to those of *Automeris io*. *Aglia* resembles *Telea* somewhat in maculation and colour, and the wings in repose are held as in this genus and *Callosamia*. In fact, the ♂ moth reminds one in many respects of *C. promethea*: the slender body, the ovate outline of the antennæ and especially their position, together with the ready diurnal flight. All these characters are opposed to the *Citheronidæ*. The ♀ *Aglia tau* has remained in a more generalized condition. The group may be considered as higher than the *Hemileucidæ*, with which it is allied in venation, and probably as entitled to family rank, as suggested by Dyar. We have shown, in 1866, that there is a general difference in antennal structure between the three families, *Saturnidæ*, *Hemileucidæ* and *Citheronidæ*, and this notice has probably served as the basis for subsequent attempts to classify the *Saturnina* upon antennal structure. In the same paper, Ann. N. Y. Lyc. N. Hist., VIII., p. 378, we draw attention to the difference in pupation. The *Saturnidæ* weave large and dense cocoons attached to objects free from and elevated above the surface of the earth; the *Hemileucidæ* spin cocoons of slighter texture on or near the ground and granules of earthy matter are mixed with the web *(Automeris)*, or in a surface cell among debris with no or little silk *(Hemileuca)*; the *Citheronidæ* enter the ground to form a cell beneath the surface, in which the naked pupa reposes, showing an analogy of

* This moth is very common in beech woods in this neighbourhood, Hildesheim, and almost everywhere in Central Europe. I should not wonder if it were in time imported by dealers, and then reported as indigenous to America, as I believe has been done with *Xyloicus pinastri*.

habit with the *Sphingina*. Consult also, for perhaps the earliest recognition of the relationship implied by the habit of pupation between the *Citheronidæ* and *Sphingina*, my "Notes on the Sphingidæ of Cuba," pp. 4–5, Phil., 1865. The larvæ of *Citheronia* and *Eacles* have the same peculiarity with the Hawk moths, that they change colour and wander restlessly about in searching for a place of entrance. The habit in pupation of *C. regalis* is described with interesting original details by Dr. Hamilton, CAN. ENT., XXI., 101. I believe the *Citheronidæ* to be exclusively American. For a note on the geographical distribution of the family, see CAN. ENT., XX., 76, 1888. Since, then, the two latter families are absent in Europe, we can only compare the *Saturnidæ* in the two faunæ. There are no identical, but probably one "representative" species, the Californian *Saturnia mendocino*, Behrens. When my good friend, Mr. James Behrens, sent me his MS. and type of the species (CAN. ENT., VIII., 149), I saw we had to do with a genuine *Saturnia*. Consult Behrens, CAN. ENT., VIII., 175, where the author says: "After examining my type of *Saturina mendocino*, Prof. Grote considers it a true *Saturnia* and points out that in its yellow hind wings it resembles *S. Carpini* ♂." I may say that had my determination been wrong, and Behrens's beautiful species belonged to an allied genus, say *Calosaturnia*, Sm., my theory that the California fauna contained some residuary palæarctic types, prevented by the mountains from spreading east, would have been damaged. But my determination holds good. I cannot now compare *mendocino* with the two smaller European forms, the types of *Hecera*, Hubn., 1806, but it may well be that it "represents" *Saturnia pavonia minor*, L. I do not know *S. galbina*, Clem., which Neumoegen and Dyar make the type of *Agapema*, reversing Prof. J. B. Smith's determination of these two forms.

The nearest ally of *Saturnia* in our Eastern fauna is *Samia cecropia*, L., and I placed this genus next to *Saturnia* in my classification in Proc. Am. Phil. Soc., 1874, as well as in my Check List of 1882. Mr. Dyar had asked me to examine the larvæ of the European *Saturnia* unknown to him in nature, so as to see whether they agreed with his definition of the family. I did so, and found the tubercles prominent, no single tubercle on ninth segment. I was impressed by the resemblance between the full-grown larva of *Saturnia pavonia major* with that of our *Samia cecropia*. I sent Mr. Dyar then the prepared larvæ of the two European species in three stages, as his testimony in the matter would relieve my own doubt

that I was correct in my observation. Mr. Dyar kindly writes me upon the specimens as follows: "They are evidently true Saturnians, as you wrote them to be, but differ from any which I have seen before, in lacking the unpaired dorsal tubercle on eighth abdominal segment. The tubercle is absent also in *Anisota* (*Citheroniidæ*), but in no other genus which I have yet seen. I thought at first that the unpaired tubercle was simply absent in *Anisota*, and wrote my first article on larvæ under that impression. But when I had the opportunity of studying the larvæ in stage I., I found that really the original tubercle i. remained unconsolidated, and ii. disappeared, just as on the more anterior segments. But in these Saturnians (*pavonia major* and *minor*) we cannot say whether i. is consolidated into an unpaired tubercle with its fellow and the structure lost, or whether i. is separate and ii. is gone. The first stage would probably not help us here, as the primitive first stage is lacking in all the Saturnians which I have seen. But, by analogy with *Anisota*, I conclude that i. is unconsolidated. *S. pavonia minor* is the more generalized form, when we come to consider the mature larva. *S. pavonia major* has suffered a modification in the evolution, and is more specialized. The secondary hairs are greatly reduced, but those that are left, together with the central setæ on the tubercles, are elongated and have acquired flattened and enlarged tips; the tubercles themselves stand up prominently and are coloured blue, strongly suggesting a simple form of our *Samia* type. I seem to see even a trace of the predominance of the subdorsal tubercles on meso- and metathoracic segments, which is so marked in the American forms. As to colour, the primitive black, seen in generalized larvæ like our Hemileucids, *Pseudohazis*, etc., is replaced gradually during ontogeny by green, as is done in *Samia*, etc., and in *Citheronia*. A beautiful adaptation to the environment."

Thus it appears from Mr. Dyar's study, that our *Samia cecropia* and allies are descendants of the same stock with the European *Saturnia*, while the position I have assigned to *Samia* as next to *Saturnia* is justified. There remains for me to point out some facts with regard to the formation of the cocoon in our American genera which induces my arrangement of the family. In *Attacus*, *Philosamia* and *Callosamia*, the larva attaches the deciduous leaf, which forms the basis and natural attachment for its web, firmly to the branchlet by a pedicel of silk. Evidently this is an acquired habit. It has been found more useful to the species that the cocoon be prevented from falling to the ground with

the fall of the leaf. *Telea* and *Actias* have not this habit. The cocoon falls in the autumn with the leaf which was used in the spinning. The Attacid group, with falcate fore wings and ovate secondaries, have generally this habit of attaching the cocoon. This proves at once the validity of *Callosamia*, which has the habit strongly developed, as compared with *Samia*, which has it not at all, but spins a thick double cocoon attached to the branches themselves, often near the ground and much after the fashion of the European *Saturnia*. I therefore place the genera with the pedicel habit at the commencement of the family, *Saturnia* and *Samia* following and closing with *Actias* and *Telea*, in which the thinner cocoon falls with the leaf to the ground. This study of the genera of our *Saturnidæ* leads virtually to the same arrangement as proposed by me in 1874; it places merely *Actias* and *Telea* together at the last, instead of commencing with them; the main point lies in the association of the genera which are naturally nearest, *Attacus*, *Philosamia*, *Callosamia*, and again *Samia* and *Saturnia*. Asking his opinion, Mr. Dyar kindly answers me that he would arrange the *Saturnina* "just like your list of 1882, except that *Thauma* and *Quadrina* should change places." I do not know *Thauma*; of *Quadrina* I had only the ♀ type, and I never possessed an example of *Gloveria*, with which Neumoegen and Dyar unite it, from a photograph of the venation furnished by Prof. Comstock, considering it the same as the European *Dendrolimus*, with the types of which I am also unacquainted. Those using the Philadelphia Check List should therefore alter the incorrect classification there adopted, for that in the New York Check List, as here amended in detail. I would also suggest, that the specimens in the National Museum in Washington be labelled to agree with the list given here, as their present labels must be, in large part, erroneous.

The first separation of the *Hemileucidæ* was by Grote and Robinson in 1866, under the name *Hemileucini*; while the genera of the *Dryocampini* grouped together in the same paper correspond to the family *Citheronidæ* of Dyar. I have elsewhere shown that Kirby is incorrect in giving *Laocoon* as the type of *Eacles*, Hubn. Verz. The type of *Eacles* is fixed by Dr. Packard in 1864; the two genera are distinct in all stages. The revision of the species of *Citheronia*, given by Grote and Robinson in 1866, has perhaps not been read by Mr. Kirby. I would follow Mr. Dyar in excluding the *Lacosomidæ* from the present series. I am indebted to Neumoegen and Dyar for details of synonymy and locality.

Family SATURNIDÆ.

Family type: *S. pavonia major*, L.

Gen. ATTACUS, Linn., 1767.

Type: A. atlas.

1. erycina, *Shaw.* South America to Mexico; Texas?
   splendidus, Beauv.
2. jorulla, *Westw.*
   cinctus, Tepp. Mexico to Arizona.

Gen. PHILOSAMIA, Grt., 1874.

Proc. Am. Phil. Soc., XIV., 258.

Type: P. cynthia.

3. cynthia, *Drury.* Atlantic Coast, introduced from Asia.
   aurotus, Fabr.
   insularis, Voll.

Gen. CALLOSAMIA, Pack., 1864.

Type: C. promethea.

4. calleta, *Westw.* Mexico to Arizona.
   polyommata, Tepp.
5. promethea, *Drury.* Canada, south and westward.
6. angulifera, *Walk.* Atlantic States; Buffalo, probably Lower Canada.

Obs.—These three genera form the first group in the family; the second consists of *Samia*, *Saturnia* and *Agapema;* the third, of *Actias* and *Telea.*

Gen. SAMIA, Hubn., 1818 (1822?).

Type: S. cecropia. (Packard restr., 1864.)

= *Platysamia*, Grt., 1865.

7. cecropia, *Linn.* Canada, southward.
8. columbia, *S. I. Smith.* Canada to Michigan; Eastern States.
9. Gloveri, *Streck.* Arizona to Rocky Mountain region.
   var. reducta, *Neum.* Mts. of Colorado, 11,000 ft.
10. rubra, *Behr.* (1855.) California to Pacific Northwest.
    californica, Grt. (1865.)
    ceanothi, Behr. (1868.)
    euryalus, Streck. (1875.)

Gen. SATURNIA, Schrank, 1802.

Type: S. pavonia major (*pyri*).

= *Heræa*, Hubn., 1806.

Type: S. carpini.

= || *Pavonia*, Hubn., 1818 (1822 ?).
= *Calosaturnia*, J. B. Smith, 1886.

Type: S. mendocino.

11. mendocino, *Behrens.* Northern coast region, California.

Gen. AGAPEMA, Neum. and Dyar, 1894.

Type: A. galbina.

12. galbina, *Clem.* Texas.

Gen. ACTIAS, Leach, 1819.

Type: A. selene.

= Tropæa, Hubn, 1818 (1822 ?).

Type: A. luna.

13. luna, *Linn.* Canada to Texas; Mexico.
var. dictynna, *Walk.*
var. Rossi, *Ross.*

Gen. TELEA, Hubn.

14. polyphemus, *Cram.* North America throughout.
paphia, Linn.
fenestra, Perry.
var. oculea, *Neum.*

Obs.—The late Mr. Hy. Edwards applied Mr. Walker's name in 1880 to a variety of *luna*, in which, as I remember, the outer margins of the wing showed a reddish band. I have not seen Mr. Walker's type. It is, I believe, that form of *luna*, found also in the north, which led Prof. Agassiz in 1860 to suspect a distinct species. The reference of *luna* to *Tropæa* is founded on the belief that the Asiatic species may belong to a distinct genus. I have not been able to compare them.

Family HEMILEUCIDÆ.

Pack., Ann. Mag. N. Hist., 173, 1893.
= *Hemileucini*, G. & R., 1866; Grote, 1874.

Family type H e mileuca maia.

Gen. AUTOMERIS, Hubn., 1818 (1822 ?).

Type: A. janus. (Grote restr., 1874.)
= *Hyperchiria*, Hubn. Verz.

Type: A. io. (Pack. restr., 1864.)

= || *Io*, Boisd., 1875.

1. Zelleri, *G. & R.* Texas.
2. pamina, *Neum.* Arizona.
   var. aurosea, *Neum.*
3. zephyria, *Grt.* New Mexico.
4. io, *Fabr.* Canada, southward.
   varia, Walk.
   Fabricii, Boisd.
   var. argus, *N. & D.*
   ♀ *var.* lilith, *Streck.* (Atlanta, Ga.)

Gen. THAUMA, Hy. Ed., 1875.

Type: T. ribis.

5. socialis, *Feisth.* West Coast, Vancouver to Chile.
   angulifera, Walk.
   ribis, Hy. Ed.

Gen. COLORADIA, Blake, 1863.

Type: C. pandora.

6. pandora, *Blake.* Rocky Mountain region.

Gen. ARGYRAUGES, Grt., 1883.

Type: A. Neumoegeni.

7. sororius, *Hy. Ed.* Lower California.
8. hualapai, *Neum.* Arizona.
9. Neumoegeni, *Hy. Ed.* Arizona.

Gen. HEMILEUCA, Walk., 1855.

Type: H. maia. (G. & R. restr., 1866.)

= *Euchromia*, Pack., 1864.

= *Euleucophæus*, Pack., 1872. (Grote ref., 1883.)

Type: H. tricolor.

10. electra, *Wright.* So. California.
11. maia, *Drury.* North America, throughout.
    proserpina, Fabr.
    var. nevadensis, Stretch.
    lucina, Hy. Ed.
    var. californica, *Wright.*
    artemis, Pack.

12. juno, *Pack.* Mexico to Arizona.
yavapai, Neum.

13. Grotei, *G. & R.* Texas to Colorado.
diana, Pack.

14. tricolor, *Pack.* New Mexico; Utah.

Gen. PSEUDOHAZIS, G. & R., 1866.

Type: P. eglanterina.

15. eglanterina, *Boisd.* Rocky Mts.; Arizona.
var. Nuttalli, *Streck.*

16. shastaensis, *Behrens.* Coast region of California; Mt. Shasta.
var. denudata, *Neum.*

17. hera, *Harris.* Rocky Mts; Eastern Oregon.
pica, Walk.
var. marcata, *Neum.*

Family CITHERONIDÆ.

Neum. & Dyar, 1894,
= *Dryocampini*, G. & R., 1866.
= || *Ceratocampidæ*, Auct.

Family type: Citheronia regalis.

Gen. EACLES, Hubn., 1818 (1822?).

Type: E. imperialis. (Pack. restr., 1864.)
= *Basilona*, Boisd., 1868.

1. imperialis, *Drury.* Lower Canada to Texas; Mexico.
imperatoria, Abb. & Sm.
didyma, Beauv.
var. punctatissima, *Neum.*
var. nobilis, *Neum.*

Gen. CITHERONIA, Hubn., 1818 (1822?).

Type: C. regalis.

= || *Ceratocampa*, Harris, 1834.

2. regalis, *Fabr.* Lower Canada to Southern States.
regia, Abb. & Sm.
var. infernalis, *Streck.*
var. saengeri, *Neum.*

3. mexicana, *G. & R.* Mexico.

4. sepulcralis, *G. & R.* Mass. to Florida.

Gen. SPHINGICAMPA, Walsh, 1864.

Type: S. distigma.

Grt., Proc. Am. Phil. Soc., 1874.

5. albolineata, *G. & R.* Mexico; Texas?
6. Heiligbrodti, *Harvey.* Arizona.
7. bicolor, *Harris.* Western States; Mississippi Valley.
   distigma, Walsh.
   var. suprema, *Neum.*
   var. immaculata, *Jewett.*
8. quadrilineata, *G. & R.* Mexico; Texas.
9. bisecta, *Lintn.* Western States to Texas.
   var. nebulosa, *Neum.*

Gen. ANISOTA, Hubn., 1818 (1822?).

Type: A. stigma. (Grt. restr., 1874.)
= *Dryocampa*, Harris, 1841.

10. stigma, *Fabr.* Atlantic States, westward.
11. senatoria, *Abb. & Sm.* Atlantic States, westward.
12. virginiensis, *Drury.* Canada, southwardly.
    pellucida, Abb. & Sm.
13. rubicunda, *Fabr.* Canada, southwardly.
    var. alba, *Grt.*
    pallida, Bowles.

Obs.—This arrangement is that adopted by me in 1874. It is possible, when the larvæ of all the forms are known, it may be slightly altered. The relationship between the types of *Adelocephala*, Boisd., and the species included by me in the extension of *Sphingicampa*, is not known. I had been inclined to look upon *Sphingicampa* as a specialized form with more affinity to *Eacles* than to *Anisota*. I have not been able to compare the larvæ properly. I had endeavoured to rescue Harris's term *Dryocampa* for *Anisota rubicunda;* but the moth does not seem to offer distinct structural characters; hence, the collective term *Dryocampini*, G. & R., 1866, must also fall. Mr. Dyar writes me positively that he thinks *rubicunda* strictly congeneric with *Anisota*, both as larva and moth. The tubercles of *Anisota* are peculiar, and Mr. Dyar finds no difference between the species. I think this settles the matter, and that the present nomenclature of the *Saturnina* can be accepted without much reservation.

THE MARX COLLECTION OF ARACHNIDA.

The eminent arachnologist, Dr. George Marx, of Washington, D. C., died January 3rd, 1895. His important collection of Arachnida has been placed by his widow in charge of the undersigned committee of the Entomological Society of Washington, to be disposed of by sale. The collection is one of the most important in existence. It contains more than one thousand species of Aranaeina alone.

Of this one thousand species, about five hundred are described species from North America. These are distribued among 175 genera. The families Theridiidæ, Epeiridæ and Theraphosidæ are particularly well-represented, and have been identified largely by some well-known authority. The Theridiidæ were in the hands of the late Count Keyserling, and about thirty of his species have their types in this collection. The Theraphosidæ have been recently in the hands of Simon, of Paris, while Dr. McCook has examined the Epeiridæ. In addition to these 500 described American species, there are about 200 species of European spiders properly identified and labelled, and nearly 300 American species which bear Dr. Marx's manuscript names. There is, further, a great mass of material which has never been worked up.

The species are many of them represented by many specimens. The collection is contained in vials in Muller's fluid, and the vials are arranged in the standard trays of Dr. Marx's own invention, as figured and described in Riley's "Directions for Collecting and Preserving Insects" (Smithsonian Institution, Part F, Bulletin 39. U. S. National Museum). The collection is of special interest, aside from the number of species, on account of the excellent representation of the boreal fauna. There are many specimens from Alaska on the west and Labrador on the east. In addition, all parts of America north of Mexico are represented. Besides the Aranaeina there are many specimens of Scorpionida, Solpugida and Pseudoscorpionida, and Pedipalpi.

After due consideration, we have decided to offer, for the present, this collection for sale for the sum of fifteen hundred dollars ($1,500).

Correspondence relative to the collection, or its possible purchase, may be addressed to any member of the committeee :

C. V. Riley, U. S. National Museum.

L. O. Howard, U. S. Department of Agriculture.

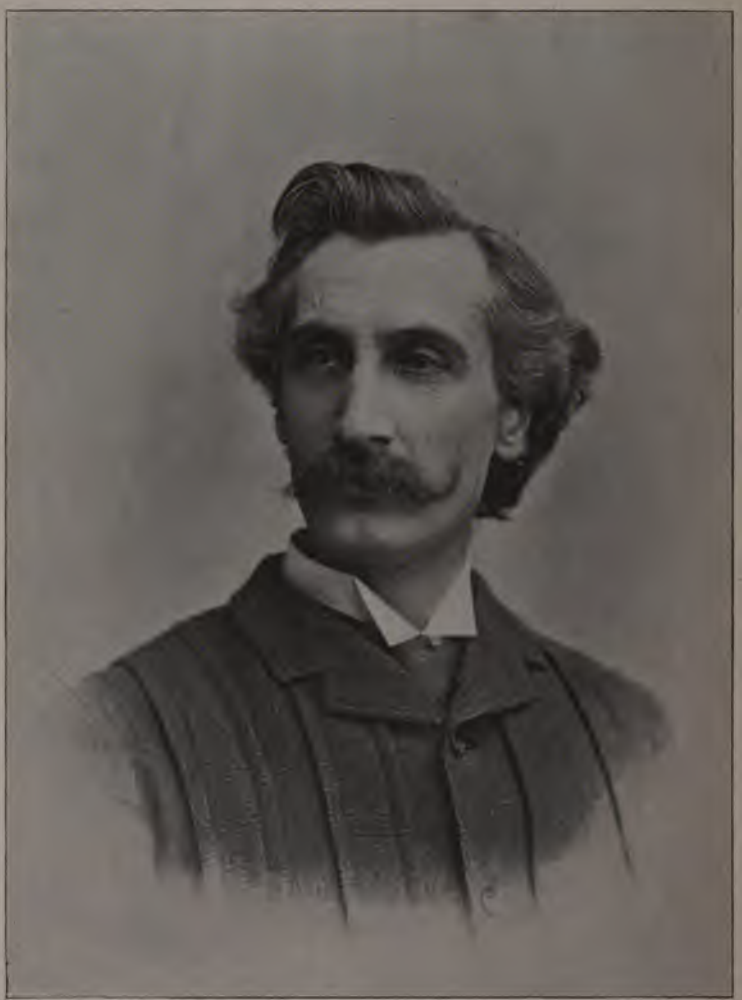
E. A. Schwarz, U. S. Department of Agriculture.

Theodore Gill, Smithsonian Institution.

Washington, D. C., August 1st, 1895.

P. S.—With the collection will be delivered to the purchaser, Dr. Marx's large and valuable library on Arachnida, comprising all the important works on the group, well-bound, together with several hundred pamphlets.

Mailed September 7th, 1895.



PROF. C. V. RILEY, M. A., PH. D.

The Canadian Entomologist.

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CHARLES VALENTINE RILEY.

In the death of Prof. C. V. Riley, the world of practical science has lost one of its brightest lights. On the morning of September 14th, Prof. Riley left his home in Washington, on his bicycle, in company with his son, to ride into the city. Not many minutes after they had started the Professor's wheel struck a stone, and he was thrown so violently from his seat, against the curb, that his skull was fractured. He was picked up unconscious, and died some hours later.

Professor Riley was an Englishman by birth, having been born at Chelsea, September 18th, 1843. He was educated in England, France, and Germany. When seventeen years of age, he came to America and settled on a farm in Illinois. Here he began his first observations on injurious insects. Four years later he went to Chicago, and from that period on to the present time he has always been accorded a foremost place among the leaders of scientific thought in America.

In 1868, Prof. Riley was appointed State Entomologist of Missouri, and it was during his tenure of that office that he prepared his celebrated nine reports on the "Noxious, Beneficial, and other Insects of Missouri." In 1878, he was appointed Entomologist to the Bureau of Agriculture; he resigned soon after, but was reappointed again in June, 1881, and held the office until about a year ago.

Prof. Riley was a man of keen perception, and possessed of great perseverance and tenacity of purpose. He was an exceptionally accurate observer, and his writings are couched in a plain, unaffected style, which never leaves any doubt as to his meaning. His investigations were markedly original, and he seldom recorded anything he had not actually seen himself. His marvellous skill as an artist enabled him to add much to the value of his writings by many exquisitely drawn figures. All his work was characterized by system and thoroughness, and, as a consequence, his writings are most valuable, and very numerous. He was also a skilful administrator, and had a faculty for gathering around him the best men available for all special lines of study. Among

the many remarkable results of his work, there are three which will always be associated with his name: the invention of the Cyclone or Riley nozzle, the discovery of the kerosene emulsion, and the introduction of *Vedalia cardinalis*, through the agency of which, in controlling the Fluted Scale, the cultivation of citrus fruits is now possible in California. As a friend, he was kind, patient and true; as an economic entomologist, take him all in all, he was far and away the most eminent the world has ever seen. Every one who could appreciate this great man and his work, will deplore the sad accident which has cut off his career when he was still at the height of his physical and mental vigour.

J. F.

STUDIES IN N. A. MEMBRACIDÆ—III.

F. W. GODING, M. D., PH. D., RUTLAND, ILL.

Subfamily CENTROTINÆ, Stol.

Multareis, gen. nov.

Head broad, with an angle on each side below the eyes, margins parallel from base to apex, which is largely produced in a spoon-shape; base of the head nearly straight; ocelli a trifle nearer the eyes than to each other, on a line above the centre of the eyes; head, at inner edge of each eye, furnished with a compressed, dentiform tubercle projecting directly forward; head inflexed below the eyes. Prothorax convex, elevated some above lateral angles, at summit, on each side armed with a short, stout (truncated?) horn, the sides of which are continuous with those of the prothorax, projecting upward, and parallel; densely punctured; basal margin projecting in a transverse carina; furnished with a percurrent median carina; posterior process gradually narrowed to the apex, which is briefly recurved in a compressed tooth or lobule; the base almost completely covering the scutellum; dorsum of posterior process furnished with two rounded tubercles, the first located at the base of the anterior convexity, the second midway between it and the apex. Tegmina coriaceous, narrow, punctured, opaque, veins irregular and numerous; barely passing abdomen, far surpassing the apex of the posterior prothoracic process; corium with the venation very irregular towards apex, there being numerous discoidal and terminal areas varying greatly in size, and three basal areas; clavus attenuated gradually to apex; wings with four apical areas, the second minute, triangular. Front tibiæ moderately dilated, with a row of fine spines along the edges.

This genus is closely related to *Anomus*, Fairm., which, possibly, ought to be arranged to include the type of Multareis. It differs from *Anomus* in the shape of the head, curve of the apex of the posterior process, tegmina not broad, destitute of hairs, number of discoidal areas, presence of dorsal horns and tubercles on the front of the head; inflexed head, and tibiæ.

Type *M. cornutus*, n. sp.

M. cornutus, n. sp.—♂, ♀. Light ferruginous, strongly punctured. In front of lateral angles, on each side, a tubercle in a fossa coloured black; tips of lateral angles, upper part of anterior swelling, horns and tip of second posterior tubercle dark ferruginous; tip of posterior process brownish-black; tegmina sordid ferruginous, veins dark brown, with two broad transverse bands, the first across the middle, the second between it and the apex sordid white; tegmina finely punctured, but uneven and rough. Abdomen dark brown, spindle-shaped and robust. Legs ferruginous.

Length, 4 mm.; breadth, 1½ mm.

Habitat—Panamint Valley, Calif.

Described from a pair received from Prof. Riley. Types in collection F. W. G., and National Museum.

Tuberculocentrus, gen. nov.

Head convex, produced in the middle, large, uneven, coarsely punctured, about half as long as broad between the eyes, which are prominent; ocelli on a line through the centre of the eyes, much farther from each other than from the eyes. Prothorax between the shoulders elevated in a rounded hump, somewhat flattened on top, densely punctured, with a percurrent median carina; at the base, behind the eyes and in front of the lateral angles, on each side, is a large tubercle in a fossa; posterior process not reaching the tip of the abdomen, long, very broad at base, gradually narrowed to the beginning of the posterior third, where it is greatly constricted, then broadened considerably and ends at the apex in a sharp point; when seen from the side it is deeply sinuate behind the hump, slightly so before the apex, which is lightly elevated. Abdomen long and broad. Scutellum truncated. Tegmina broad, extending far beyond the tip of the abdomen, coriaceous, sub-transparent; the corium divided into innumerable small areas, no regular arrangement of the veins; clavus gradually attenuated to the apex. Tibiæ triquetrous, not dilated, a row of fine spines on the edge. This is closely related to *Centrodentus*, Godg.

T. solus.— ♀. n. sp. Sordid yellow, punctured, immaculate, eyes dark brown, antennæ black, abdomen lemon-yellow, ovipositor darker, tip of abdomen brown; tegmina at the interior angle coriaceous, a little darker, veins yellow; wings with three apical areas.

Length, 4 mm.; breadth, 1½ mm.

Habitat—Death Valley, Calif.

Described from many species in the National Museum.

Subfamily DARNINÆ, Stal.

Stictopelta arizona, n. sp. — ♀. Yellow, lateral margins white. Head smooth, yellow, with a brown, transverse band just below the eyes, a darker spot near the eyes. Prothorax yellow, with a percurrent, longitudinal, median, impressed line; base narrowly brown, at the middle of the base a white line, thus: , the point resting at the base, the line becoming a band which extends around the lateral angles, along the inferior borders, ending just before the apex, which is brown: densely punctured; on each side of the base, under the curvature of the brace-shaped line, is a scar which is white in the centre with a dark brown ring. Tegmina nearly covered, the veins in the basal half nearly black, lighter towards apex. Below yellow; ovipositor fuscous.

Length, 9 mm.; width, 4 mm.

Habitat—Arizona. From Prof. Riley.

This is near *præcox*, Burm. Type in National Museum.

Subfamily SMILIINÆ, Stal.

Carynota vera, n. sp.— ♀. Reddish, sprinkled with yellow; punctured; smallest member of the genus, closely resembling in shape various species of *Stictopelta*.

Head broad, short, very obtusely triangular, rough, yellowish-red, with three yellow dots arranged in a triangle, the apex at the base of the head, the other two containing the ocelli, which are much nearer to each other than to the eyes; a dark brown curved band across the lower part of the face; eyes prominent, dark. Prothorax less elevated than other *Carynotæ*, convex in front, rising in a curve over lateral angles, extending posteriorly to the apex without any depressions nor becoming flattened; an impression, originating from behind the lateral angles at the inferior borders, on each side, extends backward and upward, meeting on the dorsum at the middle of the posterior process directly across the median carina and not at an angle; the median carina is a smooth line, per-

current, dark brown ; the posterior process rounded and very acute at the tip, which does not quite reach apex of tegmina ; there is a shining, irregular black scar near the base of prothorax on each side ; the yellow atoms are sparingly scattered over the prothorax, except those on the dorsum, which are arranged in the form of an oblong oval ; a large triangular yellow spot, shaded with fuscous, on each side at the middle of the lateral borders ; the lateral borders for about one-fourth their length very narrowly yellow. Tegmina coriaceous and mostly opaque, densely punctured, reddish ; two discoidal cells, the exterior small, round and transparent, the interior larger, triangular and opaque ; the first and fifth apical cells transparent ; the third triangular and about as broad as long. Wings with four apical cells, the second sessile. Below yellowish-red ; femora yellow with a broad reddish band just above the tips ; tibiæ triquetrous, hairy ; tarsi dark red.

Length, 7 mm.; width, 3½ mm.; altitude, 3 mm.

Habitat—Norway ; Maine. One ♀ from S. Henshaw.

SOME NOTES ON BRUCHUS IN NEW MEXICO.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEXAS.

A number of the bur-like fruits of *Glycyrrhiza lepidota*, a species of licorice native to Arizona and parts of New Mexico, were collected in the Mesilla Valley of the Rio Grande River, north of Las Cruces, in the fall of 1892. The following May, there were found issued from these burs many specimens of a Bruchid, which was identified at the Agricultural Department in Washington as *Bruchus alboscutellatus*, Horn. There were also many parasites issued, which were determined by Mr. Ashmead as *Bruchophagus mexicanus*, Ashm. I am indebted to Mr. Coville for the determination of the plant.

Many pods of the tornillo or screw-bean, *Prosopis pubescens*, were also collected in the fall of 1892, at Las Cruces. In the following May, there were found issued from these many specimens of *Bruchus amicus*, Horn. Two parasites of this species were also bred with it, and have been determined by Mr. Ashmead as *Eupelmus cyaniceps*, Ashm., and *Holcopelte producta*, Ashm.

From a pod of *Lotus* sp., collected by Professor Wooton, near Las Cruces, there issued specimens of *Bruchophagus mexicanus*, Ashm., so determined by Mr. Ashmead. This further indicates that the pods of this *Lotus* sp. are affected by a *Bruchus* sp., in the Mesilla Valley region.

PREPARATORY STAGES OF ALYPIA LANGTONII, COUPER.

BY HARRISON G. DYAR, PH. D., NEW YORK.

This larva is a close ally of *A. octomaculata*, but differs from it in the pale head, the black bands broken in the subdorsal region, the small size of the subventral white spots and the absence of the conical tubercles which are represented by black spots. The food plant is the fireweed *(Epilobium angustifolium)*.

Egg.—Laid singly on the under side of a leaf close to the projecting midrib. Flat at base, low conoidal, a little pointed at apex; micropyle depressed, surrounded by two concentric rings, granular-reticulate; from the outer ring a series of round-beaded ridges run to the under surface. These ridges under a Zeiss C objective appear as a series of rounded granules, but they alternate on successive ones so that the grooves between them are wavy as usual in the Noctuidæ. Micropyle a circular cup-shaped area of one circle of cells radiating from its centre, its edge forming the first ring. From this the ridges pass gently over the outer ring, becoming more distinct and increasing in number by the interpolation of others, confluent in pairs, but not marked on account of their granular structure. Diameter, 0.55 mm.; height, 0.3 mm. Colour whitish, not shining, marked with dark red-brown in an irregular blotched ring or broken spots, different in each egg. Duration of the stage, 9 days.

First Stage.—After hatching the larvæ walk with a looping gait, but soon begin to feed. They readily fall off by a thread when disturbed. Head bilobed, pale brown; width, 0.4 mm. Body yellowish-whitish, cervical shield, anal and leg plates blackish. Tubercles normal, brown, mostly minute, but those on joints 5–7 and 11 surrounded by large spots, those on joint 12 with small spots. Thoracic feet dark. Joint 12 enlarged, tubercles i. and ii. forming a square on it. Tubercle vi. absent, three setæ on the leg plates.

Second Stage.—At first as before; width of head, 0.5 mm. Body more brown spotted. Setæ fine, pointed, tubercles black, the subprimaries (iii. and v. on thorax and vi. on abdomen) present. Anterior two pair of abdominal feet a little smaller than the others. Later the tubercles are black, conic, irregular in size, the brown marks around them slight. The body appears green from the contained food. A dorsal line of irregular opaque white shadings.

Third Stage.—Large, black, conical tubercles with pale setæ. Body greenish, blotched with opaque white, especially dorsally; a few brown

markings as in the previous stage. Feet black. Head whitish, its tubercles all shining black, a little brown shading around mouth and eye. Width, 0.7 mm. Joints 4–7 and 12 form two humps in the position of rest of the larva.

Fourth Stage.—Head white, the black spots as before supplemented by many small dusky spots. The black tubercles form three transverse rows; a black dentate line above mouth. Width, 1.15 mm. Body white, tinged with orange on joints 5, 6 and 12 dorsally and along the region of tubercle iv. the whole length. Tubercles large, conical, black; hairs all pale, rather stiff, long, single. The body is mottled with brownish-black in irregular streaks between the tubercles, except subdorsally where the white ground prevails. Rims of spiracles, thoracic feet and leg plates, black.

Fifth Stage.—Head white with many black spots, all the spots of the preceding stage being now equally black. Width, 1.6 mm. Body as before, but the tubercles and narrow irregular marks velvety black. The orange shades spread, tending to form transverse bands; on joints 5, 6, 11 and 12 the faint orange bands are complete. The black marks are thickest ventrally, predominating, thin subdorsally; along dorsal line they form a series of irregular marks enclosing a broken white dorsal line. On the subventral folds the ground colour forms a series of white patches most distinct on joints 11–12.

Sixth Stage.—Head white with many black spots of various shapes; mouth parts black. Width, 2.3 mm. Body white, the segments banded with orange, obscurely except on joints 5, 6 and 12. Tubercles large, velvety black, low conic or almost flat, not produced. The velvety black marks on the body form narrow irregularly eroded and broken transverse lines, some only represented by angular marks, all broken subdorsally so as to give the appearance of a white subdorsal band. The lines are about eight on each segment, but so broken and irregular that they are difficult to trace. Dorsally they are partly confluent, forming branching marks irregularly X or Y-shaped. On the subventral folds the ground colour appears as a series of white patches, the largest situated between joints 11 and 12. Feet black, venter dark. Hairs long, distinct, rather stiff, white, all single and perfectly normal in arrangement for the Noctuina (*Agrotina*, Grote). The larva rests with joints 5–6 and 12 hunched up, forming two humps. Larvæ from Jefferson, N. H.

RELATIONSHIP OF THE FAUNA OF PUGET SOUND TO THAT OF MEXICO AND CANADA.

BY WILLIAM HAMPTON PATTON, HARTFORD, CONN.

The fauna of Puget Sound [as shown by a collection of fifty species of Hymenoptera from Seattle, Washington, kindly sent me by Prof. O. B. Johnson, of the University of Washington] is most like that of Canada, no genera differing.

Sphex Lucæ, Sauss, and *Astata montana*, Cress., are interesting exceptions.

Sphex Lucæ, Sauss, shows relationship to California and Lower California. Originally described from Cape Saint Lucas, Mexico. I have identified it among specimens from Lake Co., Calif., kindly sent me by Mr. Oscar T. Baron, and it is found among the species from Seattle, collected by Prof. Johnson.

Astata montana, Cress. (Syn. *Ast. elegans*, Cress., ♂ ♀; Syn. *Ast. bella*, Cress., ♂;—the three names belong to one variable species), shows a relationship to the Plateaux Region; occurring at Guanajuato, Mex., on the Mexican Tableland, where it has been collected by Dr. Duges, as identified from a female specimen presented by me to the U. S. N. M., and occurring throughout the Western United States, extending east to the Plains.

SPHINX CANADENSIS, BOISDUVAL.

Prof. C. H. Fernald says in his Sphingidæ of New England: "This very rare moth was taken at flowers in Bangor, Maine, early in July, by Prof. Carl Brown, who kindly loaned me specimens for study." I have pleasure in announcing that this rare Sphinx has been added to the Society's collection, by Mr. C. G. Anderson, who, by industrious attention to bait and electric light, has accumulated a surprising amount and diversity of good material during the first part of the season.

This is the first report of *S. Canadensis* being taken in Ontario, that I am aware of. Mr. Grote refers to it as a Northerly species; and gives its habitat as Canada, Newfoundland, Maine. Rev. T. W. Fyles and Mr. Strecker have reported it from Quebec Province, but Mr. Strecker afterwards received a specimen that was taken near Cincinnati. Nothing as yet seems to be known of its early stages or food plants. Mr. Strecker's excellent coloured illustration of it in his Rhopaloceres and Heteroceres Plate XIII., fig. 13, is unmistakable, whilst his description, page 106, under the name of *S. Plota*, supplemented by that of Prof. Fernald, leaves nothing further to be desired in that direction. Mr. Anderson has also taken what appears to be a black form of *S. Gordius*.

J. ALSTON MOFFAT, London, Ont.

NEW TENTHREDINIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Periclista, Knw.—This name was proposed by Knonow in his monograph of the European Blenocampids, published in the "Winer Ent. Zeit.," V. 1886, 186, for those species having the lanceolate cell petiolate, the eyes more or less remote from the bases of the mandibles, and the posterior wings with the outer cells closed by a marginal vein. This name had already been used by Forester, 1869, for a genus of Cynipidæ, and I therefore propose the name *Mogerus* (μογερός) to take its place.

Blennocampa bipartita, Cress.—From an examination of a type specimen of this species, received from the American Entomological Society, I find that this species should be referred to the genus *Mogerus*.

Mogerus emarginatus, n. sp. ♂.—Black, with the following parts luteous: the labrum, the femora, the tibiæ, the base of the tarsi, and the apex of the first, second, third and fourth abdominal segments indistinctly so; the collar and the tegulæ, white; the clypeus, angularly emarginate; the antennæ, thickened at base, especially the third and the fourth segments, the third segments about one-fourth longer than the fourth; the wings hyaline; the veins brown; the costa and the stigma luteous; the anterior ocellus in a basin which connects with a transverse sinus which is caudad of the posterior ocelli. Length, 6 mm.

Habitat—Boston, Massachusetts. One specimen. This is the species and specimen referred to by Mr. Harrison G. Dyar in the CAN. ENT., XXVI., 1894, 185, as *Blennocampa bipartita*, where a description of the larvæ has been published.

Selandria floridana, n. sp. ♂.—Black, with the following parts yellow: the clypeus (the labrum is fuscous), the tegulæ, a line on the collar, a spot on the mesopleuræ, the legs, including the coxæ, except the middle and posterior tarsi, the caudal margin of the ventral abdominal segments, and the entire apical segment; the clypeus truncate; the labrum rounded; the antennæ slightly thickened in the middle, the third segments one-third longer than the fourth; the wings blackish-fuscous, paler at apex; the veins, including the costa and the stigma, black; the body shining, impunctured; the lanceolate cell without a cross-vein, open at the shoulder; the posterior wings with two middle cells. Length, 4.5 mm.

Habitat—Ormond, Florida.

A single specimen received from Mrs. Annie Trumbull Slosson. Readily separated from the described American species by the colour of the pleuræ.

Tenthredo bilineatus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the front beneath the antennæ, an ovate spot on the antennal ridges above the base of each antenna, the lower half of the cheeks, an elongate mark on the inner margin of the eye (this mark is half as long as the inner margin of the eye, reaching the meso-caudal angles of the eye, obliquely truncated in front, roundly emarginate on its mesal side, extending slightly beyond the caudal margin of the eye, a fine spur extending from the middle of its caudal margin to an elongate, quadrangular spot along the latero-caudal margin of the head, sub-interrupted from the mark on the cheeks, not extending mesad beyond the mesal margin of the spot or the inner margin of the eye), a small spot on the vertex, in a line with the spots on the latero-caudal margin of the head and caudad of the ocelli, the tegulæ, the collar, two lines on the mesonotum, converging behind, a broad line from the scutellum to the base of the anterior wings, the cenchri, a small triangular spot on the cephalo-dorsal corner of the mesopleuræ, a spot above the posterior coxæ, the basal membrane, two large spots on the sides of the basal plates, the trochanters, the bases of the femora, the front tibiæ and tarsi, and the middle tibiæ slightly beneath; the following parts rufous: the first segments of the antennæ entirely and the second and third on the inner side, the front and middle femora, the tibiæ above, the posterior femora beneath at apex, the posterior tibiæ, the middle and posterior tarsi, the venter, a narrow margin to the tergal segments one to three, and the tergal segments beyond the third; the third segments of the antennæ one-third longer than the fourth; the clypeus emarginate; the wings hyaline, slightly yellowish; the veins black; the costa and the base of the stigma luteous. Length. 6 mm.

Habitat—Ithaca, New York.

This species will be readily recognized by the markings on the head and mesonotum and the colour of the basal segments of the antennæ and the apex of the abdomen.

Tenthredo pallipunctus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the lower part of the cheeks, a line on the collar, a spot above the posterior

coxæ, the anterior legs, including the coxæ, beneath, and the middle tibiæ beneath (the middle femora have blotches of yellow beneath, so that specimens will probably be found having the femora yellow beneath); the third segments of the antennæ one-third longer than the fourth; the clypeus emarginate; the wings hyaline, slightly fuscous; the veins, including the costa and the stigma, brownish. Length, 11 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *flavomarginis*, from which it differs in having the tegulæ and basal plates black.

Tenthredo rufostigmus, n. sp. ♂.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the lower half of the cheeks, the tegulæ, an abbreviated line on the caudal part of the pleuræ, a spot above the posterior coxæ, the front and middle coxæ except above, the posterior coxæ at side, the front legs, beyond the coxæ, beneath, and the middle trochanters and femora beneath; the following parts rufous: the middle tibiæ beneath, the middle tarsi, the posterior femora beneath, the posterior tibiæ and tarsi, and the abdomen, including the venter, beyond the basal plates except a spot on the base of the first tergal segment; the third segments of the antennæ one-fourth longer than the fourth; the clypeus squarely emarginate; the wings slightly infuscated; veins black; the costa and the stigma rufous. Length, 10 mm.

Habitat—Craig's Mt., Idaho. Prof. J. M. Aldrich, collector.

This species is related to *discrepans*, from which it differs in having the posterior femora rufous with a black line above.

Tenthredo atravenus, n. sp. ♂.—Black, with the following parts rufous: the legs beyond the trochanters except a spot on the bases of the femora above (the posterior tarsi are yellowish), the apex of the second abdominal segment, the third, fourth, and fifth abdominal segments entirely, and the base of the sixth abdominal segment; the third segments of the antennæ one-half longer than the fourth, the clypeus truncate; the labrum rounded, yellowish-fuscous at sides; the wings slightly clouded, more pronounced on the apical half; the veins black; the costa rufous; the stigma yellow, fuscous at base. Length, 10 mm.

Habitat—Juliaetta, Idaho. Prof. J. M. Aldrich, collector.

This species is related to *sectilis*, from which it differs in having no pale spot above the posterior coxæ.

Tenthredo terminatus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on

the cheeks, the tegulæ, the latero-dorsal angles of the pronotum, a spot above the posterior coxæ, a spot on the sides of the basal plates, a fine line on the apical margin of the basal plates and the first and second abdominal segments, the front and middle legs, including the coxæ, beneath, the extreme apices of the posterior coxæ, and the posterior trochanters beneath; the following parts rufous: the posterior legs beneath beyond the trochanters, the tergal segments beyond the second, the sides of the third and fourth abdominal segments, and the ventral segments beyond the fifth, including the guides of the ovipositor; the clypeus squarely emarginate; the third segments of the antennæ one-third longer than the fourth; the wings subinfuscated; the costa and the base of the stigma rufous; the veins black. Length, 12 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *nigricoxus* and *bella;* from the former it differs in not having the pale spot above the posterior coxæ wanting, and from the latter in having a black line above on all the legs.

Tenthredo æqualis, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the cheeks, the tegulæ, a line on the collar, a spot above the posterior coxæ, the anterior tibiæ beneath (the anterior femora are paler beneath; probably specimens will be found in which they are yellow beneath), and the anterior tarsi; the following parts rufous: the femora, the middle and posterior tibiæ and tarsi (the anterior tibiæ have a fine black line above), a spot on the middle of the second and third tergal segments, larger on the third, the tergal segments beyond the third, and the ventral segments beyond the fifth except the ventral margin of the ovipositor; the clypeus squarely emarginate; the third segments of the antennæ twice the length of the fourth; the wings hyaline, the veins black; the costa and the stigma at base luteous. Length, 5 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *lunatus* and *olivatipes;* it differs from the former in having a pale spot above the posterior coxæ, and from the latter in having the scutellum black and the legs rufous.

Tenthredo ventricus, n. sp. ♂.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the front beneath the antennæ, the cheeks, a fine line on the collar, a spot above the anterior coxæ, a spot above the posterior coxæ, and a spot on the sides of the basal plates; the following parts rufous: a fine line on the

inner margins of the eyes, the tegulæ, the prosternum, the mesosternum, and the mesopleuræ, the legs, including the coxæ, except a black line on the coxæ and trochanters and femora above (the front and the middle legs are somewhat yellowish beneath), and the abdomen beyond the middle of the first segment; the clypeus squarely emarginate; the third segments of the antennæ one-third longer than the fourth; the wings hyaline; the veins brownish; the costa and the stigma luteous. Length, 11 mm.

Habitat—Colorado. Mr. Carl F. Baker, collector.

This species is related to *rubelloides* and *hyalinus;* it is separated from the former by having the tibiæ entirely pale, and from the latter by the rufous mesopleuræ and mesosternum and the squarely emarginate clypeus.

Macrophya pulchella alba, n. var. ♀.—Black, with the following parts yellowish-white: the clypeus, the labrum, the mandibles except at apex, a triangular spot on the collar, the tegulæ, a circular spot on the pleuræ, the basal plates, the scutellum, the postscutellum, the front and middle legs, including the coxæ, except a ring on the apex of the tibiæ and the apices of the apical segments of the tarsi, the posterior coxæ and trochanters, the basal half of the posterior femora, and the tibiæ except a ring at the base and apex. Length, 8 mm.

Habitat — Indiana (Baker), Pennsylvania and Illinois (Nason), and New York.

Macrophya punctata, n. sp. ♀.— Black, with the following parts white: the clypeus, the labrum, a spot on the bases of the mandibles, two spots on the caudal margin of the vertex, a narrow line on the collar, the tegulæ at base, the anterior coxæ beneath, the apices and a line on the side of the middle coxæ, a large spot on the sides of the posterior coxæ, the trochanters, the front femora, tibiæ, and tarsi beneath (the apices of the segments of the tarsi are ringed with black), the apical half of the middle femora beneath, the middle tibiæ beneath, a ring on the middle of the posterior tibiæ, the middle and posterior tarsi except the apices of the segments, and two spots on the apex of the basal plates at middle; the clypeus broadly and roundly emarginate; the third segment of the antennæ twice the length of the fourth; the wings slightly infuscated; the veins, including the costa and stigma, black. Length, 10 mm.

Habitat — Plattsburg, New York. Mr. H. G. Dyar, collector

This species is related to *lineata*, from which it is separated by the colour of the posterior femora.

Macrophya minuta, n. sp. ♂.— Black, with the following parts white: the labrum, the mandibles except at apex, the outer margins of the tegulæ, the cenchri, the front and middle coxæ at apex, the posterior coxæ at apex and an ovate spot at side, the trochanters, the front and middle femora and tibiæ beneath, the front and middle tarsi except fuscous rings on the apices of the segments, and a narrow ring on the base of the posterior femora; the clypeus broadly emarginate; the labrum angularly emarginate; the head and thorax coarsely punctate; the third segments of the antennæ about one-fourth longer than the fourth; the wings hyaline; the veins black; the stigma, except its front margin, blackish rufous; the lanceolate cell contracted at middle. Length, 6.5 mm.

Habitat—Plattsburg, New York. Mr. H. G. Dyar, collector.

OENECTRA FLAVIBASANA, FERN.

On the 20th of June, 1895, Mr. Balkwill brought to me some Tortricid moths which he found at rest upon honeysuckle in his garden. They were new to me. He asked if I wanted any more? I said I would take all he liked to bring of that kind; so by the 27th I had got about three dozen of them. Being desirous of learning something about them, I applied to Prof. C. H. Fernald for information, and sent some of the moths. He replied: "They are *Oenectra flavibasana*, Fern. That he had two specimens in his collection; the types: one from Texas and one from Illinois. That nothing is known of their early stages or food plants, and would be glad to have published all that was known on these points." Up to the present time I can give nothing with certainty upon these points. Presumably, the larvæ had fed upon the honeysuckle, as chrysalids were found in the connate leaves with a thin silken web spun over them, one of which I raised to the moth. There is plenty of evidence of feeding having been done upon the plant, but nothing positive as to what did it. A lookout is being kept upon the plants for the next brood.

The original description was published in the Transactions of the American Entomological Society, Vol. X., p. 69, 1882. I see by it that the types are females. I may mention that the males are decidedly smaller in size, and lighter in colour, as a rule; otherwise the sexes do not perceptibly differ. J. Alston Moffat, London, Ont.

REVIEW OF A FEW MORE PROVANCHER TYPES OF ICHNEUMONIDÆ.

G. C. DAVIS, AGRICULTURAL COLLEGE, MICHIGAN.

In making a study of the Provancher types of Ichneumonidæ while at Quebec a year ago last winter, the type of many of the more recent descriptions was not found in the collection. Since that time types of many of the Abbé's latest descriptions have been found to be with the ones who sent the material, and are not lost, as was at first feared. Mr. W. H. Harrington, of Ottawa, has quite a number of these types, and through his kindness and generosity I have been privileged to study the types in his possession. The following notes are the result of this review :

Ichneumon citrinus ♂ = *Hepiopelmus*, Wesm.—This would be an Amblyteles by Cresson's synopsis.

Amblyteles superbus = *Amblyteles suturalis*, Say.

Phaeogenes annulatipes = *Ichn. annulipes*, Cress.

Phaeogenes pinguis is a *Cryptus*. The ovipositor is almost as long as the abdomen.

Stilpnus deficiens = *Thersilochus*.—The abdomen is piceous, with segment 2 and the tip paler.

Phygadeuon marginatus = *Herpistomus*.

Phygadeuon longicornis = *Cryptus incertus*, Cress.—The metanotum has two transverse carinæ, the tegulæ are reddish-black, and the abdomen is tipped with a pale spot at the apex above.

Phygadeuon fusiformis = *Cryptus montivagus*.—The only difference is in the posterior tarsi, which are pale, but segments 2–4 are not yellowish as in typical *montivagus*. According to Provancher (See p. 408 of "Add. et Corrections") *Phygad. annulatus* = *fusiformis*, and so making it a synonym also.

Phygadeuon gracilicornis = *Herpistomus*.

Phygadeuon fraterculus = *Cryptus*.

Phygadeuon similaris = *Cryptus soror*, Cress.—It is a typical *soror* except the white scutellum. It may become a variety.

Phygad. capitalis ♂.—Probably O K, but may prove to be a ♂ *Cryptus*. The petiole is narrow, gradually enlarged, almost straight, spiracles in or just back of the centre. Front with a large irregular tubercle just beneath the antennæ, apparently caused by an injury.

Cryptus pubescens, ♀, O K.

Cryptus segregatus, ♂, O K.—From the description of this species

and *perditus* one would be led to believe they were synonyms, but the two types are quite different. *Segregatus* may be known by the translucent, very narrow, lanceolate stigma, while the stigma of *perditus* is broad, triangular and opaque. The tegulæ are white in *segregatus*, black in *perditus*.

Cryptus perditus has only one wing remaining, but is apparently a Hemiteles.

Cryptus mellipes = *Cryptus alacris*, Cress.

Cryptus sordidus = *Cryptus extrematus*, Cress.

Cryptus longicaudus, O K.—The tegulæ are black instead of white.

Cryptus ignotus, O K.

Cryptus pentagonalis, ♂ and ♀ O K.

Hemiteles gigas = *Platylabus*.

Hemiteles declivus, O K.

Hemiteles aciculatus, O K.—The description of colour markings is faulty. The nervures and stigma are brown; the posterior coxæ with the basal joint of the trochanters are black; the extremity of the tibiæ and tarsi is dusky; abdominal segments 3 and 4, except at the sides, with a part of 5, and 2 at the apex, red.

Hemiteles debilis, O K.

Mesostenus armatus, O K.—The areolet being open behind would place it in Foerster's genus *Otacustes*. There are some of Mr. Cresson's species that also belong here.

Mesostenus latigaster = *Tryphon*.

Mesostenus pluricinctus is not a Mesostenus. The oblique, slightly petiolate areolet would lead one to place the specimen with the Tryphoninæ, but the long ovipositor, curved petiole and general form place it nearer the Cryptinæ, where Provancher placed it. By the lunulæ, Foerster would place the specimen in his Phygadeuonidæ, and by the spiracles being in the middle of the petiole, it would belong to his genus *Diacritus*. Provancher's description of the species is not very complete. Points that might be added, besides those given above, are: Lower edge of clypeus, a small dot at the base of each antenna beneath, and a line beneath the primary wings, yellowish-white; a short, transverse median ridge on posterior part of metanotum; ovipositor nearly as long as abdomen; posterior coxæ and trochanters as long as or longer than the femora; claws large; front tibial spurs large and curved. The longitudinal carinæ on the metanotum, of which Prov. speaks, are so very

indistinct that they are hardly traceable. The species has evidently proved a stumbling-block to the Abbé in his work, as he has placed it in three different subfamilies, and each one under a new species. *Mesoliptus rufipes*, *Echthrus pediculatus* and the present species are one and the same. They are all, with very little doubt, synonyms of Cresson's *Mesoliptus (?) muliebris*, which is the ♂. The venation, form and markings are the same except that the ♂ ♂ are paler in colour.

Pezomachus sulcatus = *Pettitii*, Cress.—The sulcate groove of the mesonotum is perhaps a little deeper and plainer than in *Pettitii*, but is present in both, and the two species seem to be identical in all other respects.

Anomalon rufulum, ♀, O K.

Anomalon rufulum, ♂ = *Anomalon chlamidatum*, Prov.

Limneria Guignardi, O K.—Up to a very recent date I have supposed that this species was synonymous with *fugitiva*, Say. This seems to have been the general belief from the number of specimens in various collections under the name *fugitiva*. Say's description of *fugitiva* gives "posterior tibiæ white with black tip and base." Provancher's description of *Guignardi* reads: "The posterior (tibiæ) black with a large white annulus in the middle and another smaller at the base." I have found one typical *fugitiva*. *Guignardi* is the common species.

Thersilochus erebundus ♂ = *Porizon angulare*.

Mesoleptus angustus, ♂ and ♀, O K.

Mesoleptus rufomixtus, ♂, O K.

Mesoleptus nigricornis, ♀ = *Ctenopelma*.

Exenterus hullensis, ♂, O K.

Through the kindness of Mr. Guignard, I have been privileged to examine a few Provancher types in his collection. The following is a summary of this examination:—

Stilpnus appendiculatus = *Hemiteles humeralis* ♂.

Phygadeuon Guignardi = *Ichneumon mendax*, Cress.

Hemiteles mucronatus is O K.

Cryptus ornatus, O K.

Cryptus erythropygus, O K.

Cryptus 3-annulatus, O K.

Cryptus gracilis, O K.—*Cryptus rectus* answers the description of this species quite as well if not a little better. They are probably synonymous, though perhaps not.

Cryptus albonotatus, O K.

Limneria Guignardi has already been spoken of in referring to the types in Mr. Harrington's collection.

Bassus dorsalis ♀ = *Hemiteles* ♂.—This is the true type and not the specimen in the Provancher collection referred to the genus Plectiscus.

Ephialtes variatipes is the ♂ of *Ephialtes macer*, Cress.

SYSTEMATIC VALUE OF THE LARVA OF SPERMOPHAGUS.

BY WM. HAMPTON PATTON, HARTFORD, CONN.

The seeds of *Gleditschia triacanthus* frequently show a narrow scar upon the surface. Rarely two of these scars are found upon the same seed. These scars are about one-eighth of an inch long; and indicate the presence of *Spermophagus gleditschiæ*, a Bruchid beetle, of a mottled, tawny appearance, frequently bred from these seeds in the spring. The grub remains in the seed over winter, changes to pupa in the spring and soon emerges, as a perfect beetle, through a rounded hole in the side of the bean-seed.

The larva, observed by me in the middle of December, is an incurved Chrysomelaform grub, provided with three pairs of legs, as well developed as those of the larva of *Eupsalis* and *Anthribus*. The thoracic segments are the thickest and the body tapers towards the apex. The head is partly sunken in the first segment. Along the sides the segments are slightly protuberant, and in other particulars an analogy to the larvæ of the typical Rhynchophora is shown; but the presence of thoracic legs proves the insect to belong to a different family of beetles. In the young larva the legs are probably long as in that of *Bruchus*. Mr. H. F. Wickham, in a paper published in 1894, describes the larva of *Spermophagus*.

Prof. J. O. Westwood, in Vol. I. of his "Introduction," states that the larva of *Bruchus* has minute legs. The larva of *Bruchus fabæ*, Riley, has been figured by Dr. Packard (Am. Nat., Sept., '73, p. 537, fig. 141) as a footless grub with a minute head. The larva of *Spermophagus* shows this to be an error, the head being of considerable size, and there being six legs. The mandibles were evidently mistaken for the head by Dr. Packard; and the head mistaken for the first segment. Mr. F. A. Marlatt (2nd Rep. Kansas Ex. Sta., p. 210) says the larva of *Bruchus obsoletus*, Say, is footless; but his figures, 2 and 3, on plate IX., give a better representation and show the legs.

NOTES ON A TRIP TO THE BAHAMA ISLANDS.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Comparatively little is known of the insect fauna of the Bahama Islands, since most of the collectors who have gone to the West Indies have confined their attention chiefly to larger and better settled members of this great group, and as a consequence we have a tolerably fair knowledge of such of them as Cuba, Jamaica, Porto Rico, and Guadaloupe, with scarcely any records from the little rocky islets of which the Bahamas proper are composed. Late researches on the coast of Florida have shown a close affinity between the fauna of that region and of the Antilles, so that the study of the insects of the latter has now a direct bearing on that of those of our own domain. The short sketch which follows is intended merely as a preliminary account of a collecting trip to certain points in the British West Indies, and no more is hoped for than to give the reader a general idea of the coleopterous fauna of these at the time of year during which the collections were made. Only occasionally was it possible to land and work the country for insects, as the main object of the expedition, of which the writer was a member, was the study and collection of the marine invertebrata, and most of the time was necessarily devoted to them.

Regarding the general characters of the Bahama Islands, it may be enough to say that they are British possessions, having been first settled in 1629 by that people, but frequently changing hands until 1783; since that time they have remained under English control, and are populated largely by descendants of that nationality, with a very considerable admixture of negroes, who, indeed, predominate on some of the islands, almost to the exclusion of the whites. Excepting the very small rocky islets, all are inhabited, but the soil is so light and stony that its productive powers are limited, and hence we find the principal exports to be fruit, especially pineapples and cocoanuts. Aside from these, some of the larger islands export brazilleto, yellow-wood, lignum-vitæ and fustic, and at one time cotton was an article of considerable commercial importance, but is now little grown. The citrus fruits flourish, but are apparently not exported to any great extent. The uncultivated portions of the surface, which include the greater part of the whole area, are covered in the main by tangled thickets of various shrubs and vines difficult of penetration, and hard to work in. Owing to the broken nature of the islands, farming can only be carried on in small patches and in the most primitive manner.

The geographical features are rather remarkable : the group forms an irregular triangle, the sides of which are about 720, 600 and 200 miles long. They lie within the influence of the trade winds, and inside the zone of hurricanes, which often do much damage, as the islands are mostly small and low, usually under 100 feet above tide level, the loftiest not over 400, while often they lie almost even with the water. In composition they are chiefly white sandstone or coral rock more or less disintegrated, often with sand beaches of dazzling whiteness. Situated on the edges of coral banks, often of a most dangerous character, and with so little of commercial attractiveness, we find most of the trade between the Bahamas and United States to consist of "fruiting," which is carried on in small schooners of from 150 to 200 tons burthen, plying chiefly between the island ports and Baltimore.

With this rather extended preliminary account, attention may now be directed towards the insect fauna. The first researches we made in this direction were on Egg Island, May 12th. This is a small wooded islet about a mile in length and 67 feet high ; on the topmost point is situated a lighthouse, while the beach along the harbour is adorned with an extensive cocoanut grove. Arriving about six o'clock in the evening, a short trip was made ashore, one of the objects in view being the capture of fireflies, which could be seen flitting around in the thickets. Only one could be captured, however, and this proved to be a *Pyrophorus*, a genus of Elaterid beetle in which the light is emitted from two whitish spots, one on each side near the hind angles of the prothorax. This light is under the control of the insect to some extent, since two or three of the beetles that were knocked down became at once invisible, when they could certainly have been seen had the light continued. It was found later that in such cases the *Pyrophorus* could often be taken by carefully feeling in the dark for it—placing the palm of the hand flat on the ground over the spot where it was thought the specimen had fallen, and its presence would then be betrayed by its "snapping" in the manner of most elaters when pressure is applied.

Next morning another opportunity was afforded for going ashore, and by beating bushes over an umbrella a good number of additions were made to the collections of Coleoptera, though search along the beach and lagoons yielded no Cicindelidæ nor Carabidæ whatever. It is probable that they are rare on the island, as they seem, in fact, to be in most spots in the

Bahamas. A number of the Staphylinid, *Cafius bistriatus*, Er., were taken under sea-weed, in just such situations as they frequent along our southern Atlantic coast. On the bushes were found an *Olibrus*, a number of the widely-distributed *Coccinella sanguinea*, a little *Scymnus*, a curious Lathridiid which probably belongs to the genus *Monædus*, and a number of specimens of a very small *Corticaria*. A species of *Monocrepidius* was found occasionally, which looks like our *M. lividus*. A *Hemiptychus* obtained here agrees with Dr. Leconte's description of *H. similis*, which occurs in Florida, while another species of the same genus, together with *Catorama* and a *Petalium*, occurred occasionally. The Cerambycidæ were represented by *Eburia stigma*, Oliv. (*duvalii*, Chevr.), an *Elaphidion* of small size and two species belonging to genera not yet identified. The Chrysomelidæ furnished species of *Cryptocephalus* and *Pachybrachys*, the former being represented most commonly by what seems to be *C. marginicollis* or a closely-allied form. Weevils were tolerably plentiful, especially an *Artipus*, which was everywhere in evidence ; more rare were species of *Pachnæus* and *Conotrachelus*. *Lembodes solitarius*, Boh., a very curious weevil, found also in Florida, was beaten from herbage on the hill ; it looks very little like a weevil, the posterior end being truncate and emarginate, while the pronotum is long, flattened, and extends quite over the head when the beetle is at rest. The prosternum is deeply excavated for the reception of the rather heavy beak, but the large legs seem not to be closely approximated to the body when the insect feigns death, but rather simply folded. The upper surface of the body is roughly sculptured and heavily scaled—a fringe of the latter around the anterior prothoracic margin giving that part a very strange appearance. The aspect of the beetle when shaken into a net is, on account of its grayish and brownish hues, irregular shape and sculpture, that of a small piece of dead twig, or a withered bud.

During the next week the vessel was cruising on the banks, and no land was touched. All this time, of course, nothing could be done in the line of Entomological work beyond keeping a lookout for such insects as might fly or be blown on the vessel. On the morning of May 18th, while lying some fifteen miles off Riding Rock, and after a heavy squall from that direction the night before, three moths were taken on the deck of the schooner, and also a specimen of *Cicindela tortuosa*. This was the first tiger-beetle our party saw in the Bahamas, though they were found in small numbers later on.

Water Cay, which is on the Salt Cay Bank, far to the westward of the main group of the Bahamas, was the next point at which we landed, and here a hard row of five miles was necessary to reach the shore. Only three hours were afforded for an examination of the place, and thus few insects were found. The main inhabitants were sea birds, which were excessively numerous, and bred in the crannies in the rocks, and hermit crabs *(Cenobita diogenes)*, which occupy the places we are used to think of as belonging to the ground beetles. The rocky surface of the Cay, with its patches of coral sand and occasional hollow filled with black soil, was destitute of the wooded covering such as we saw on Egg Island, and diversified only by a few straggling bushes and herbs. A *Polycesta* was taken, however, which seems to be *velasco*, while an *Euphoria* has been referred with some doubt to *E. sepulchralis*, from my specimens of which it differs in the darker colour, with less metallic lustre, and more evident white markings, as well as in the somewhat coarser sculpture. The other genera that were recognized are: *Scymnus*, *Saprinus*, *Catorama*, *Cryptocephalus*, *Phaleria*, *Artipus* and *Dryotribus;* the last probably *D. mimeticus*, Horn, which has been taken in the Florida Keys.

For several weeks after leaving Water Cay nothing further was done in the Bahamas, the intervening time being spent in the vicinity of Cuba and Florida. Returning, we finally reached Harbor Island, near the northern end of Eleuthera, after a long run from Key West, and were promptly run fast on a sand-bar by a pilot. Landing on the morning of August 9th, the surface of the island was found to resemble that of Egg Island, which is in the immediate vicinity; the webs of two or three large showy spiders were common in the brush, while the song of invisible Cicadas ("singers," the Bahamans call them) filled the air on every side. Butterflies were more numerous than usual, but not being the especial object of search they were neglected for the sake of the favorite Coleoptera, since there was no time to carefully collect both. Turning, therefore, to the beetles, a little *Plochionus* was beaten from bushes as the sole representative of the Carabidæ. There were plenty of *Cafius bistriatus* on the beach under sea-weed, while of the Coccinellidæ there were beaten from bushes specimens of *C. sanguinea*, *Psyllobora nana*, and a little *Scymnus*. Several of the *Monocrepidius* mentioned as occurring on Egg Island were found here, also the Longhorn *Spalacopsis filum*, Klug. Of Chrysomelidæ there were not many—a Halticid and an Eumolpid being the most showy ones—and of Tenebrionidæ the most notable form was a

Phaleria allied to or identical with our *Phaleria longula*, but they were of a dark variety, black or brown above, with occasionally one showing a clay-coloured elytral border. *Anchonus* was found commonly under a drift log, this being the genus described from Southern Florida under the name *Gononotus*, Leconte. *Artipus* was extremely common in the brush, and may be found injurious in the Bahamas, as it has of late in Florida—its omnivorous habits rendering it a foe to many different plants.

It is only a few hours' run from Harbour Island to Spanish Wells, at the northern end of Eleuthera, so when some of the party came on deck next morning they were not surprised to find the vessel skimming along the rocky coast of that island, which, from its size and wooded surface, seemed to offer the most favourable conditions for collecting insects of any of the Bahamas that we had seen. About sixty miles in length, though very narrow, this island supports a larger population than most of its neighbours, and is said to be particularly adapted to the cultivation of the pineapple, while oranges, bananas and sapodillas are raised in some quantity. There are also large cocoanut groves on the beaches, the nuts being exported in greater or less numbers.

Here were found the first specimens of tiger-beetles that we had seen on the islands, two species, *Cicindela marginata* and *C. tortuosa*, being taken, the former the more commonly. It was rather too warm in the sunshine to make chasing them a particularly agreeable task, so a few examples were made to fill our wants. Of Carabidæ we took, or purchased, specimens of a *Scarites*, which, though probably *subterraneus*, is smaller than any of these that we have seen elsewhere, *Plochionus pallens* and *Apenes opaca*. The same Staphylinidæ and Coccinellidæ were captured as already given for Harbour Island, while in some of the succeeding families Eleuthera seemed much richer. A large *Pyrophorus* was common in the cocoanut groves, the lights gleaming for a moment and then disappearing in a way very provoking to one not familiar with the ground, and likely at any moment to run into a tree or fall over a log in the chase in the dark. The native children, however, were glad to catch them for us at the rate of a half-penny each, and in this way a good series was obtained with little trouble. The Buprestidæ were represented by *Acmæodera cubæcola*, Duval, and *Gyascutus carolinensis*, Horn ; the Ptinidæ by species of *Hemiptychus*, *Catorama* and *Sinoxylon*, while Longicorns were numerous in specimens, though not many species were

seen. Of these, *Elateropsis rugosus*, Gahan, seems worthy of special note, as it has been very rare in collections, and only since our taking it on Eleuthera has the exact habitat been known. In both sexes the upper surface is extremely roughly sculptured, forming rugosities on the disk of the thorax and elytra, and to a lesser degree on the head. The antennæ are brown or black, the legs reddish, but the sexes differ widely in the colour of the upper surface, which, in the males, is uniform brown or blackish, while in the females there is a broad stripe of white pubescence on the head, and three (one median, two lateral) on the prothorax, while the elytra have each a broad dorsal and narrow lateral stripe. In perfectly fresh examples the thorax has also an incomplete transverse basal band. A series of over forty specimens shows that the males vary in length from 16 to 32 mm., while the females run from 21 to 35 mm. A fine *Elaphidion* occurred on the island, also specimens of *Eburia stigma*, *Plectromerus dentipes*, and a *Cyllene*. An example of *Spalacopsis* I refer to *S. filum*, Klug, of which specimens are known from Porto Rico, Cuba, Haiti, and Florida. It is a curious insect, with a general resemblance to *Dorcasta cinerea*, and having the antennæ clothed with hairs in much the same manner, but the body is much more elongate, and when the beetle is beaten into a net it assumes a position of perfect rigidity, in which condition it can scarcely be distinguished from a bit of stick. Several Chrysomelidæ were obtained, all small and belonging chiefly to the Eumolpini and Halticini. Further, there are species of *Bruchus*, *Hymenorus*, *Oxacis* and *Anthicus*, but as usual the chief development seems to be in the Rhynchophora, where the following genera have been thus far recognized: *Artipus*, *Pachnæus*, *Anthonomus*, *Conotrachelus*, *Chalcodermus*, *Macrancylus* and *Dryotribus*. There are also several which are yet unknown, and may remain so for some time, since the Coleopterous fauna of these little islands has received no particular attention, and has formed the subject of no special memoirs. It is hoped, however, that the labours of the British West Indian Committee will result in the publication of a long series of papers similar to those lately published through their instrumentality, and in the clearing up of the questions surrounding the affinities and origin of the fauna of this group, which has evidently a close relationship with some portions of our own.

LIST OF LEPIDOPTERA TAKEN AT SUDBURY, ONT.

BY JOHN D. EVANS, TRENTON.

This list embraces all the species of diurnals captured, viz., 51, and those of the nocturnals, 125, but of the latter possibly as many more are as yet undetermined. To Mr. Jas. Fletcher for the butterflies, and Mr. J. B. Smith and Rev. Geo. D. Hulst for the nocturnals, I am indebted for their kindness in making determinations; to the first named I am also deeply grateful for many kindnesses extended at various times and for counsel and advice.

Among the diurnals special mention may be made of *Erebia discoidalis*, Kirby. Upon one occasion only (12th May, 1889) has this species been captured in this district, when the writer took five specimens, 4 ♂'s and 1 ♀, all in good condition, and Dr. Peters, at the same time and place, took two or three specimens, but the sexes were not ascertained.

During the season of 1886, *Colias interior* was quite common and *C. philodice* very rare, but in subsequent seasons the latter became the more numerous and the former very scarce :—

Danais Archippus, *F.*
Argynnis Cybele, *F.*
" Aphrodite, *F.*
" Cipris, *Edw.*
" Atlantis, *Edw.*
" Myrina, *Cram.*
" Bellona, *F.*
Melitæa Harrisii, *Scud.*
Phyciodes Nycteis, *Doub.-Hew.*
" Tharos, *Dru.*
Grapta Comma, *Har.*, form Dryas, *Edw.*
Grapta Faunus, *Edw.*
" Gracilis, *Gr.-Rob.*
" Progne, *Cram.*
" J. Album, *Bd.-Lec.*
Vanessa Antiopa, *L.*
" Milberti, *Godt.*
Pyrameis Atalanta, *L.*
" Huntera, *F.*
Pyrameis Cardui, *L.*
Limenitis Arthemis, *Dru.*
Debis Portlandia, *F.*
Neonympha Canthus, *Bd.-Lec.*
" Eurytris, *F.*
Erebia Discoidalis, *Kirby*,
Satyrus Alope, *F.*, form Nephele, *Kirby.*
Thecla Humuli, *Harr.*
" Calanus, *Hbn.*
Feniseca Tarquinius, *F.*
Chrysophanus Hypophlæas, *Bd.*
Lycæna Pseudargiolus, *Bd.-Lec.*, form 1 Lucia, *Kirby.*
Lycæna Pseudargiolus, form 2 Marginata, *Edw.*
Lycæna Pseudargiolus, form 3 Violacea, *Edw.*
Lycæna Comyntas, *Gdt.*

Pieris Napi, *Esper.*, form Oleracea-hiemalis, *Har.*
Colias Eurytheme, *Bd.*, form Eriphyle, *Edw.*
Colias Philodice, *Gdt.*
" Interior, *Scud.*
Papilio Turnus, *L.*
Carterocephalus Mandan, *Edw.*
Pamphila Zabulon, *Bd.-Lec.*, var. Hobomok, *Harr.*
Pamphila Zabulon, *Bd.-Lec.*, form ♀ Pocahontas, *Scud.*
Pamphila Manitoba, *Scud.*
" Peckius, *Kirby.*
" Mystic, *Scud.*
" Cernes, *Bd.-Lec.*
" Metacomet, *Harr.*
Amblyscirtes Vialis, *Edw.*
Nisoniades Brizo, *Bd.-Lec.*
" Icelus, *Lint.*
" Juvenalis, *F.*
Eudamus Pylades, *Scud.*
Hemaris diffinis, *Bdv.*
" pelasgus, *Cram.*
Deilephila Chamænerii, *Harr.*
Ampelophaga myron, *Cram.*
Sphinx Kalmiæ, *S. & A.*
" drupiferarum, *S. & A.*
" chersis, *Hbn.*
Ceratomia undulosa, *Walk.*
Triptogon modesta, *Harr.*
Smerinthus geminatus, *Say.*
" cerisyi, *Kirby.*
Paonias excæcatus, *S. & A.*
Cressonia juglandis, *S. & A.*
Sesia—sp. ?
Ctenucha Virginica, *Charp.*
Alypia Mac-Cullochii, *Kirby.*
Hypoprepia fucosa, *Hbn.*
Callimorpha Lecontei, *Bdv.*
Platarctia hyperborea, *Curt.*
Arctia parthenice, *Kirby.*
" virguncula, *Kirby.*
" determinata, *Neum.*
Pyrrharctia isabella, *S. & A.*
Phragmatobia rubricosa, *Harr.*
Spilosoma virginica, *Fabr.*
Hyphantria cunea, *Dru.*
Halisidota caryæ, *Harr.*
Ichthyura inclusa, *Hbn.*
" albosigma, *Fitch.*
Gluphisia trilineata, *Pack.*
Lophopteryx elegans, *Strk.*
Pheosia rimosa, *Pack.*
Oedemasia badia, *Pack.*
Cerura occidentalis, *Lint.*
Actias luna, *Linn.*
Telea polyphemus, *Cram.*
Dryocampa alba, *Grt.*
Clisiocampa Americana, *Harr.*
Hepialus argenteomaculatus, *Harr.*
Thyatira scripta, *Gosse.*
Raphia frater, *Grt.*
Arsilonche henrici, *Grt.*
Acronycta innotata, *Gn.*
" dactylina, *Grt.*
" distans, *Grt.*
" sperata, *Grt.*
" oblinita, *S. & A.*
Rhynchagrotis placida, *Grt.*
Eueretagrotis perattenta, *Grt.*
Pachnobia salicarum, *Walk.*
Agrotis ypsilon, *Rott.*
Peridroma astricta, *Morr.*
Noctua plecta, *Linn.*
" C. nigrum, *L.*

Noctua clandestina, *Harr.*
Feltia jaculifera, *Gn.*
Porosagrotis mimallonis, *Grt.*
Carneades messoria, *Harr.*
" ochrogaster, *Gn.* var.
" obeliscoides, *Gn.*
" divergens, *Walk.*
Mamestra purpurissata, *Grt.*
" grandis, *Bdv.*
" rosea, *Harr.*
" cristifera, *Walk.*
" adjuncta, *Bdv.*
" legitima, *Grt.*
" lorea, *Guen.*
Hadena impulsa, *Gn.*
" sputatrix, *Grt.*
" devastatrix, *Brace.*
" arctica, *Bdv.*
Hillia vigilans, *Grt.*
Hyppa xylinoides, *Gn.*
Brotolomia iris, *Gn.*
Nephelodes minians, *Gn.*
Hydrœcia nictitans, *Bkh.*
" nitela, *Gn.*
Leucania albilinea, *Hbn.*
" adonea, *Grt.*
" commoides, *Gn.*
Caradrina miranda, *Grote.*
Orthodes cynica, *Gn.*
Taeniocampa oviduca, *Grt.*
Cosmia paleacea, *Esp.*
Scoliopteryx libatrix, *L.*
Calocampa nupera, *Lint.*
Plusia bimaculata, *Steph.*
" octoscripta, *Sanb.*
" ampla, *Walk.*
Erastria carneola, *Gn.*
Drasteria erechtea, *Cram.*
Syneda Alleni, *Grt.*
Catocala briseis, *Edw.*
" concumbens, *Walk.*
" relicta, *Walk.*
Catocala antinympha, *Hbn.*
Prochœrodes clemataria, *S. & A.*
" transversata, *Dru.*
Metanema inatomaria, *Gn.*
Ennomos magnaria, *Hubn.*
Azelina hubnerata, *Gn.*
Endropia effectaria, *Walk.*
" bilinearia, *Pack.*
" madusaria, *Walk.*
Sicya macularia, *Harr.*
Angerona crocataria, *Fabr.*
Semiothisa enotata, *Gn.*
" granitata, *Gn.*
Phasiane atrofasciata, *Pack.*
" trifasciata, *Pack.*
Thamnonoma wauaria, *L.*
" evagaria, *Hulst.*
Lozogramma defluata, *Walk.*
Orthofidonia exornata, *Walk.*
Caripeta latiorata, *Walk.*
Dasyfidonia faxiniaria, *Minot.*
Hæmatopis grataria, *Fabr.*
Caterva catenaria, *Cram.*
Cleora semiclusaria, *Walk.*
Boarmia pampinaria, *Gn.*
" umbrosaria, *Gn.* near var.
" larvaria, *Gn.*
" crepuscularia, *Tr.*
Tephrosia canadaria, *Gn.*
Baptria albovittata, *Gn.*
Lobophora montanata, *Pack.*
Petrophora testata, *L.*
" nubilata, *Pack.*
Rheumaptera ruficillata, *Gn.*
" lacustrata. *Gn.*
Hydriomene trifasciata, *Bork.*
Epirrita inclinata; *Walk.*
Plemyria fluviata, *Hbn.*
Phlyctænia tertialis, *Gn.*
Loxostege chortalis, *Grt.*
Scoparia centuriella, *S. V.*

OBITUARY.

CHARLES W. STROMBERG died at his home in Galesburg, Ill., on Tuesday, March 26th, 1895, of consumption. He was in failing health for a number of years, and made a trip to Phœnix, Arizona, early in 1894, returning in November of that year, but did not find the relief he anticipated. His most grievous illness only preceded his death about a month. Mr. Stromberg was born in Sweden, July 24, 1856, and came to the United States with his parents in 1866. He was a resident of Galesburg up to the time of his death. He early became devoted to scientific studies, and for the past fifteen years has been a close student and collector in Entomology, making a specialty of Coleoptera, of which he had a most complete collection. He was exact and thorough in all his scientific work, as was recognized by his Entomological correspondents in both the United States and Canada, and in the neatness and care with which his exchanges were prepared. He was known, either personally or by correspondence, to all the prominent coleopterists in North America, and his field notes on his favourite families were always read with pleasure and interest.

Mr. Stromberg was quiet, reserved, and gentlemanly in his tastes and disposition, and was held in high esteem by all who knew him. His death, at a comparatively early age, is a serious loss to Entomology, as his genius for correct classification, his thorough observation and his deftness in handling would in the near future have placed him among the foremost workers in this branch of science. He was a welcome contributor to the leading Entomological journals, and an extensive collector for the Colleges of his State.

W. KNAUS, MacPherson, Kansas.

MR. C. H. TYLER TOWNSEND, temporary Field Agent of the Division of Entomology, U. S. Department of Agriculture, desires to inform his correspondents that he has again removed to Las Cruces, New Mexico.

Mailed October 5th, 1895.

AGROTIS SUBGOTHICA, TRICOSA AND HERILIS.

The Canadian Entomologist.

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FELTIA SUBGOTHICA, HAWORTH, OR AGROTIS (SUBGEN. AGRONOMA) JACULIFERA, GUENEE, WHICH?

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

The latest statement of this case by the two recognized authorities, Mr. Grote and Prof. J. B. Smith, is as follows:

From "Bull. 44, U.S. Nat. Mus., p. 81 (1893)," by J. B. Smith,

Feltia subgothica, Haw.
jaculifera, var. Gn.
jaculifera, Gn.
tricosa, Lint.

From "List of N. Am. Europteridæ, * * * and Agrotidæ p. 24 (1895)," by A. R. Grote.

Subgen. *Agronoma*.

Agrotis jaculifera, Gn.
subgothica, Auct. nec Haw.
tricosa, Lint.
jaculifera, Sm. in err.
jaculifera, var. A, Gn.

From 1873, when *jaculifera*, Gn. was first placed in the synonymy of *subgothica*, Haw. by Mr. Grote, until 1890, all American entomologists accepted the reference and did not use Guenée's name. In 1874, Dr. Lintner described Guenée's *jaculifera*, var. A, as a distinct species—*tricosa*, and correctly restricted Mr. Grote's *herilis* (described in 1873) to *jaculifera*, var. B, Gn. Prof. Smith's revision of the synonymy (Bull. 38, U.S. Nat. Mus., p. 111) was made in 1890, principally on the authority of Mr. Butler, who said the year before that "*tricosa*, Lint., is typical *jaculifera*; *herilis* is a poor variety." Mr. Grote bases his recent revision on the authority of Mr. Tutt, who stated (CAN. ENT., XXIII., 159 and 202): "I think there can be no doubt that Haworth's description applies to a well-known variety of *Agrotis tritici*."

An historical investigation which I made, a few years ago, of the names of the species of *Drasteria*, suggested that perhaps a similar critical study of the early literature of the insect under discussion might throw some light on the subject and enable one to arrive at an approximately correct synonomy. What little experience I have had in this line of work leads me to believe that there must be much similar critical study before the nomenclature of the moths reaches anywhere near the stability that Mr. Scudder's historical investigations have given to the nomenclature of the butterflies.

In 1810, Haworth described (Lep. Britt., p. 224) *subgothica* from a supposed English specimen; the sale catalogue of Haworth's collection published in 1834 indicates that he had but one specimen. As Haworth's work is very rare (I have not been able to get track of a single copy in this country), and as neither Mr. Grote (CAN. ENT., XXIII., 202) nor Prof. Smith (Bull. U. S. Nat. Mus., No. 44, p. 81) have ever seen the original description of *subgothica*, the following copy of it (obtained through the kindness of Mr. Champion, Librarian of Ent. Soc. of London) will be of interest and value:

"185. *subgothica*. (The Gothic Dart) alis griseo-fuscis, costa late at dimidiatim, stigmatibusque pallidis.
Habitat in Anglia valde infrequens. In Musæis tribus solum vide.
Expansio alarum. (Mr. Champion gives no figures.)
Descriptio. Præcedentibus *(sagittifera)* affinis absque punctis posticis sagittatis. Stigma anticum, subtriangulare, posticum reniforme: ante et inter hæc arcus niger qui reversus apparit in alis expansis. Stigma teliforme prægrande a basi fere ad medium, sed lineolis duabis divaricatum transversis interruptum. Posticæ pallidæ fimbria fusca."

No figure of the insect is given, and it is not definitely known if the single type specimen exists, thus much depends upon this description. Is there anything in it that does not apply to our American insect? Does it fit any known variety of the European *tritici* better?

Except in Stephens's Catalogue, *subgothica* seems not to again appear in the literature until 1829, when Stephens describes and figures (Ill. Brit. Ent., Haust., II., p. 126, pl. 22, fig. 3) an insect as *subgothica*, which he

says he obtained from a Mr. Raddon, who had evidently labelled it "near Barnstaple, Devon." A photographic copy of Stephens's figure is reproduced at *1a* on the plate. This figure is accepted by Mr. Grote (CAN. ENT., XXIII., 202) as that of *jaculifera*, Gn., but Prof. Smith doubts it (Bull. 44, U.S. Nat. Mus., p. 81). However, I think that a glance at the next figure of the insect that appeared, taken doubtless from Stephens's specimen, will remove all doubt as to what insect Stephens tried to represent. This figure, which is reproduced at *1 b* on the plate [it is enlarged to natural size], is from Wood's Index Entomologicus, pl. 9, fig. 149 (1839). All must admit that it is one of the best figures of our American insect ever published. Although Wood does not state definitely that his figure was made from Stephens's specimen, we know he did thus make use of Stephens's collection for many of his figures, as he states in his preface. But one more figure of the insect seems to have appeared in English works. This one, by Humphrey (in Humphrey and Westwood's British Moths and their Trans., I., pl. xxiv., fig. 1, 1843), was recently referred to by Mr. Barrett (Ent. Month. Mag., XXV., 224) as being certainly a variety of *A. tritici*. The fact is, as Humphrey states, that his figure was copied from Stephens's figure; this was evidently not known to Mr. Barrett, as the context of his article indicates. Humphrey's figure is reproduced at *1c* on the plate.

Up to 1847, the English entomologists considered *subgothica* a British insect and a distinct species. Then, Mr. Doubleday stated (The Zoologist, V., 1728) that "Haworth's insect is evidently simply a variety of either *Agrotis tritici* or *aquilina*. The species described and figured by Stephens is American." For many years after this the name *subgothica* rarely appeared in British lists and only as a variety of *tritici*; it apparently does not occur at all in recent lists. It has never been taken in England, so far as I can find any record, since Stephens's time.

The name *subgothica*, Haw., was introduced into American literature by Dr. Fitch in 1856 (Second Rept. on Insects of N. Y., p. 546). It has been in universal use here since, and no American writer has seriously questioned the identity of our species with the *subgothica* of Stephens and later English writers, or even with the *subgothica* of Haworth, until 1891, when Mr. Grote changed his mind in accordance with the opinion of Mr. Tutt. I think that all now agree that the species under discussion is distinctly American. It undoubtedly has never occurred in England, notwithstanding the records of its English habitat by the earlier English

writers. Dr. Fitch suggested that the eggs or larvæ may have been accidentally carried to England, but Doubleday's explanation is doubtless the more correct one. He says (The Zoologist, V., 1729): "I have traced all the specimens which I have seen of this species (the one described by Stephens) in collections of British Lepidoptera to one source, and I believe the gentleman who distributed them [Mr. Raddon is the gentleman referred to] inadvertently mixed a number of North American insects with his British ones. I received from him as *British* a Bombyx which my brother took in Florida; and Mr. Benjamin Standish possesses two Bombyces, one of them a Cerura, the other perhaps a Notodonta, from the same entomologist, which were sent to him as British, whereas both are well-known North American insects." There can be no doubt that several American insects found their way into the larger English collections formed in the beginning of the present century; and some of these, as Doubleday points out, were described by Haworth and Stephens as English insects. The evidence on this point is very conclusive as regards *Drasteria crassiuscula*, Haw.

Wood's figure (*1b* on the plate) and Doubleday's testimony are sufficient evidence, I think, that the *subgothica* of Stephens and later writers is our common American insect. But, is Haworth's *subgothica* the same as Stephens's? Probably Haworth's single type specimen could not now be found, if it exists at all. Without the specimen, we must depend on the original description and a little circumstantial evidence to settle this point. Haworth's specimen may easily be the one which Mr. Barrett recently found in an old English collection made up of specimens obtained from older collections by a Mr. Burney, who was contemporary with—and corresponded with—Haworth and others, and many of whose insects ultimately fell into his hands (Ent. Month. Mag., XXV., 223). Mr. Barrett says there was one specimen that proved to be really a type of *A. subgothica*, and the specimen was not a variety of *tritici*. Mr. Dale says (p. 246 of the same magazine) that this specimen "probably came from Mr. Raddon, the gentleman referred to by Mr. Doubleday" as having introduced several American insects into English collections; Stephens's figure was made from one of these specimens. Haworth's description seems to apply very well to our American insect, and it also affords a valuable bit of circumstantial evidence in the remark that he had seen the species in only three museums. It is hardly probable that one of these three col-

lections was not that of Stephens, then one of the few great English collections. Thus, I believe that the weight of evidence indicates that the *subgothica* of Haworth and Stephens were the same species.

But, curiously enough, while all American entomologists have claimed the name *subgothica*, Haw., for our insect, the English authors since Doubleday have claimed Haworth's insect as a variety of their *tritici*. Doubleday said it was "simply a variety of either *tritici* or *aquilina*," but it was soon restricted to the former in British lists, and it is still considered as such by Mr. Tutt. The evidence in support of this seems to be confined principally to the simple statement of Doubleday, although Tutt intimates that he has seen Haworth's description; but Tutt does not (CAN. ENT., XXIII., 159) know our American insect. I think the evidence produced to show that Haworth's *subgothica* is our American insect outweighs any opinion which English writers, who do not know our insect, may form from the original description alone.

The name *jaculifera*, which occupies so conspicuous a part in the synonymy of this insect, was proposed by Guenée, in 1852, for an American insect. His description of the species includes a good characterization of the type, followed by brief descriptions of two varieties, A and B. I think both Mr. Grote and Prof. Smith agree that Guenée's figure (reproduced at *1 d* on the plate) and his description of the type of the species correspond to what American writers have been calling *subgothica*, Haw., for the past quarter of a century. *Jaculifera*, Gn., was first placed in the synonymy of *subgothica*, Haw., in 1873, by Mr. Grote, and on the same page he described both of Guenée's varieties, A and B, as a new species—*herilis*. In 1874, Dr. Lintner made a careful study of the forms included under Guenée's specific title *jaculifera*, with the result that Mr. Grote's *herilis* was restricted to *jaculifera*, var. B, Gn., and var. A was described as a new species—*tricosa*.

No one has since questioned the specific rank of Guenée's varieties. Therefore, according to Canon XXVIII. of the A. O. U. Code of Nomenclature, the name *jaculifera* must be restricted to the first or main part of Guenée's description; this is the only portion of the description that can apply to his figure or to the insect under discussion. It is true, as Prof. Smith says (Bull. 38, U. S. Nat. Mus., p. 113): "Under all circumstances Guenée's name must stand for one of the forms, since he had all three before him," but in 1873 and 1874 the name was restricted to, or "was retained for that portion of the group to which it was first applied"

(to use the language of the Canon referred to) by Mr. Grote and Dr. Lintner. Therefore, I cannot understand how Guenée's name can be consistently applied to Dr. Lintner's *tricosa*, and it is not in accordance with the rule of nomenclature just cited. The fact that the form which agrees with the main part of Guenée's description and with his figure may or may not be a synonym of *subgothica*, Haw., does not affect the case in any way. I believe Mr. Grote is right in his protest (CAN. ENT., XXIII., 151) against the resuscitation of *jaculifera* at the expense of *tricosa*.

As has been stated, Prof. Smith's synonymy is founded principally on the statement of Mr. Butler that "*tricosa*, Lint., is typical *jaculifera; herilis* is a poor variety." The antennal differences between *herilis* and *tricosa*, pointed out by Prof. Smith, show that Mr. Butler did not study the species very carefully. The other point has been discussed by Mr. Grote as follows: "Guenée happens to figure typical *jaculifera* and he figures typical *subgothica!* Prof. Smith does not quote Guenée's illustration, which contradicts both Butler's statement and his own course. Guenée's types of '*jaculifera*,' or so-called 'types,' were several in number at least, as he included two other species as varieties. One of these so-called types Mr. Butler may have, and this may be a *tricosa*, Guenée's var. A. Guenée made three mistakes as to his material: First he described and figured *subgothica* as *jaculifera;* then he described specimens belonging to two different species, *tricosa* and *herilis*, as varieties of *jaculifera*. Under no circumstances can Butler's statement be correct (CAN. ENT. XXIII., 151)." The enlarged figures (twice natural size) of a front and hind wing of each of the three species just discussed show some of their differences and will aid in their determination. I believe the above evidence warrants the following synonymy for these much-discussed forms:

subgothica, Haw.
    jaculifera, Gn. (type and figure).
tricosa, Lint.
    jaculifera, var. A, Gn.
herilis, Grote.
    jaculifera, var. B, Gn.,

or the same as that given by Dr. Lintner in detail in 1874 (Ent. Cont., III., 161), and accepted by Mr. Grote until recently.

Shall it be *Agrotis*, *Feltia*, or *Agronoma subgothica*, Haw.? Apparently Mr. Grote and some other systematists are not yet ready to

accept all of the new genera which Prof. Smith has recently proposed in his revision of the old genus *Agrotis*. While I am a thorough believer in the value of sexual characters in the classification of the Noctuids, I should hesitate to establish genera upon them without first examining other than our own fauna. In a recent study of the genus *Drasteria* I found that all of the known species in our fauna had decidedly asymmetrical male genitalia, while the species in the allied genera *Euclidia* and *Caenurgia* had not; nor had this peculiarity been noticed in any other Noctuids. Although none but American forms have been placed in *Drasteria*, I am sure that at least one of the common European Euclidias belongs to it, but I am not yet sure that this European species does not have symmetrical male genitalia.

While it is true that Walker insufficiently characterized his genus *Feltia*, yet the description of a species—*ducens*—made it a valid generic title; and as *ducens* is a synonym of *subgothica*, Prof. Smith had a right to recognize *Feltia*. But Mr. Grote now claims (in his List for 1895) that *Feltia* must fall as a synonym of Hübner's genus *Agronoma*. Hübner placed four European species in the genus, and Mr. Grote thinks the type species is *valligera (vestigialis)*. Now, if it can be shown that *subgothica* is congeneric with the European *valligera*, and both Stephens and Guenée mention a resemblance, then Mr. Grote is right in placing *Feltia* in the synonymy. Mr. Grote gives *Agronoma* only subgeneric rank. I prefer to leave the discussion of this point to Messrs. Grote and Smith; it will require a more critical study and comparison of the American and European species than has yet been made before the question can be settled.

In the light of our present knowledge, I prefer to continue to use the name *Agrotis subgothica*, Haw., which has become so familiar to American entomologists from its frequent use in both our systematic and economic publications.

Agrotis murǣnula.

In his last revision of the Agrotids (Bull. 44, U. S. Nat. Mus., p. 85) Prof. Smith placed *murǣnula*, G. & R., in the synonymy of *vetusta*, Walk. This called forth the following protest from Mr. Grote under the above heading (CAN. ENT., XXVI., 81): "Two species, properly referred by me at the time to *Agrotis*, were described by Walker under the same specific name *vetusta*. One of these turns out to be, as I had suggested in my essay, *murǣnula*, G. & R., and this latter name, I claim,

under the custom and as accepted in Staudinger's catalogue, should be retained for the species it designates, since at the time it was free to be named and no subsequent generic separation can overturn its real and conceded right at the time it was proposed. *Vetusta*, Walk., as applied to *murænula*, must be relegated to the synonymy."

The facts are that Walker described *Mythimna vetusta* in 1856 and *Agrotis vetusta* in 1865; and Grote and Robinson described *Agrotis murænula* in 1868. In 1882, Mr. Grote stated that perhaps *Mythimna vetusta*, Wlk. (not both this species and *Agrotis vetusta*, as Prof. Smith states in Bull. 38, U. S. Nat. Mus., pp. 125 and 212), was *murænula*, and that it certainly was an *Agrotis*. Walker had thus unwittingly given two species of *Agrotis* the same specific name, and hence one was free to be renamed. But which one—the one described in 1856 as *Mythimna vetusta* or the *Agrotis vetusta* described in 1865? Mr. Grote evidently assumes that the former name must fall, but usage and consistency dictate that the older name should be retained. An examination of type specimens by Prof. Smith shows that *Mythimna vetusta*, Wlk., and *Agrotis murænula*, G. & R., are the same species. Then *murænula* must be placed in the synonymy of the older *vetusta*; and Walker's *Agrotis vetusta*, if it proves to be a valid species, is free to be renamed, and must be renamed should it be congeneric with *Porosagrotis vetusta*, Wlk. Thus, I believe the facts warrant Prof. Smith's use of the name *vetusta*, Wlk., for *murænula*, G. & R. Mr. Grote seems to have omitted *Porosagrotis obesula*, Smith, from his List for 1895.

THE SECOND ANACRABRO, AND THE SMALLEST AMERICAN OXYBELUS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Anacrabro boerhaviæ, n. sp. or var.—♂ about 7 mm. long; differs from *ocellatus* by the yellow markings, which are as follows:—Dorsum of prothorax and tubercles yellow, the tubercles with a black central dot. Mesothorax all black, except a small yellow spot on each side at hind border, adjacent to yellow spot of scutellum. Scutellum with a pair of large yellow spots. Postscutellum yellow. Inner side of anterior half of anterior femora yellow. Tibiæ yellow, with more or less black behind. Tarsi yellow, slightly tending to orange. Segments 1-6 of abdomen presenting a yellow spot medially, and a large yellow patch on each side. The median spot on first segment is round, that on 2-3

transversely oval, that on 4 transversely spindle shaped, that on 5 broad with truncate ends, that on 6 nearly square, but slightly constricted on each side. Lateral patches more or less bifid at their inner ends, and produced to a point below on lateral margin of abdomen. Strongly punctured, much more sparsely on pleura. Pubescence of face and cheeks silvery. Eyes very large, at least as near together on middle of face as the two upper ocelli are to one another.

Hab., Las Cruces, N. M., Aug. 23, 1895, on *Boerhavia*, believed to be *B. erecta*. The type is now in Coll. Am. Ent. Soc. Since this does not seem to differ structurally from *A. ocellatus*, Pack., the only species hitherto described, Mr. Fox suggests that it may be but a variety of it. The nearest known locality for true *ocellatus* is West Point, Nebraska.

The *Boerhavia* has sticky flower-stalks, which catch insects—for what purpose I do not know. *Harrisina coracina* is often seen dead on the stalks, caught by the sticky exudation.

Oxybelus cladothricis, n. sp.—♀ about 3 mm. long; rather shiny, especially the abdomen; with a strong lens the head and thorax appear to be minutely punctured; with a compound microscope the surface is seen to be minutely reticulated, and regularly and not densely punctured. Head large. Second joint of flagellum decidedly shorter than first, third a little shorter than second. Wings hyaline, nervures dark brown, marginal cell pointed at tip. Colour black, with the abdomen entirely red. Median hind border of prothorax broadly, tubercles, squama, tibiæ except one side of posterior ones, and a large portion of anterior femora, white. Tarsi brownish or rufescent. Tegulæ pale testaceous. Sides of face, cheeks, and pleura with glittering white pubescence. Spine minute, straight, obscurely notched at tip. Squama with the two sides united, the points terminal and curved inwards, the median notch rounded.

♂ a little smaller, abdomen narrower, and ornamented with glittering silvery pubescence, forming narrow bands at distal margins of segments. No lateral spines on abdomen. Squama broader, squarely notched in middle, the points more curved.

Hab., Las Cruces, N. M., early in Sept., 1895, on *Cladothrix cryptantha*, the plant determined by Prof. Wooton.

This *Oxybelus* will be easily known by its small size, and red abdomen. The pointed marginal cell is also peculiar, as *4-notatus*, *cornutus*, *emarginatus*, *sparideus*, *aztecus*, and probably most of the genus have it narrowly truncate. It is pointed in *argenteopilosus*, judging from Cameron's figure, though nothing is said about the matter in the description.

BUTTERFLIES OF SOUTHERN MANITOBA.

BY E. F. HEATH, THE HERMITAGE, CARTWRIGHT, MAN.

The following is a list of Diurni taken in Southern Manitoba about Section 35, Township 2, Range 15, W. of the first principal meridian, near the Village of Cartwright, and collected at intervals during the last ten or twelve years :—

Papilio oregonia, Edw.—Only once seen, and taken three years ago—a rather worn specimen. Taken in July.

Papilio asterias, Fab.—General, but not very abundant.

Papilio turnus, Linn.—General, but not very abundant, except in '93, when it was rather numerous.

Papilio turnus, Linn.—Very dark ♀ — very heavily banded ; appeared later than the ordinary form.

Pieris protodice, Bd.-Lec.—Common and abundant.

Pieris rapæ, Linn.—Occasionally.

Pieris napi oleracea, Esper.—Occasionally.

Nathalis iole, Bd.—One specimen only seen. Taken flying over some flowering annuals in garden, about end of July.

Colias eurytheme, var. Eurytheme.
Colias eurytheme, var. Keewaydin, with the albino form.
Colias eurytheme, var. Eriphyle.
} All very abundant. Ariadne seems to be absent.

Danais archippus, Fab.—Abundant throughout the summer.

Argynnis cybele, Fab.—Abundant. Occurs during July.

Argynnis cipris, Edw.—Occasionally in August.

Argynnis aphrodite, Fab.—Very rare, one only taken.

Argynnis lais, Edw.—Abundant. Occasionally in August.

Argynnis myrina, Cram.—Abundant. Occurs in the early spring.

Argynnis bellona, Fab.—Abundant. Occurs in the early spring.

Euptoieta claudia, Cram.—Occasionally and generally, during July and August.

Phyciodes nycteis, Doubl.-Hew.—Common. Of this I have taken one curious variety, in which the orange is replaced by white ; the specimen not being at all worn.

Phyciodes carlota, Reak.—Common

Phyciodes tharos, Dru.—Common.

Grapta interrogationis, Fab., var. Fabricii.—Occasionally. On wild hop, in August.

Grapta interrogationis, var. umbrosa.—Occasionally.
Grapta comma, Harr., var. dryas.—Rarely.
Grapta progne, Cram.—Not common.
Vanessa antiopa, Linn.—Abundant in the latter end of summer.
Vanessa californica, Bd.—Two specimens taken. Not seen for some years.
Vanessa milberti, Godt.—Abundant.
Pyrameis atalanta, Linn.—Sometimes abundant.
Pyrameis huntera, Fab.—Some years ago, I think in 1884, this insect was abundant, so much so that I only caught one or two specimens, thinking it would be equally general in other years. Since then I have only seen and taken one insect. Occurred in August.
Pyrameis cardui, Linn.—Common in some years, scarce in others.
Limenitis arthemis, Dru.—Common in June and July.
Limenitis disippus, Godt.—Occasionally in June and July.
Neonympha canthus, Bd.-Lec.—Locally and occasionally occurs latter end of June and July.
Cœnonympha inornata, Edw.—Common.
Satyrus nephele, Kirby.—Very common.
Satyrus nephele, v. Boopis.—Very common.
Chionobas varuna, Edw.—One only seen and taken, and that a rather worn specimen, during August.
Thecla calanus, Hub.—Rare.
Thecla strigosa, Harr.—Abundant; occurs in July.
Thecla augustus, Kirby.—Only one seen and taken during May.
Thecla titus, Fab.—Common during July.
Thecla.—Not identified; appears to be a new species. Only one seen and taken some years ago.
Chyrsophanus helloides, Bd.-Lec.—Abundant in June and July.
Lycæna sæpiolus, Bd.—Only two specimens taken at the end of June.
Lycæna Couperii, Grote—Common in May.
Lycæna pseudargiolus, v. neglecta, Edw.—Common in June.
Lycæna pseudargiolus, v. lucia, Edw.—Rare
Lycæna melissa, Edw.—Common in July.
Lycæna comyntas, Godt.—Rarely seen.
Lycæna amyntula, Bd.—Common during June and July.
Lycæna aquilo, Bd.—Only one seen and taken June 12th, 1894.
Carterocephalus mandan, Edw.—Local and not abundant, in July.

Thymelicus garita, Reak—Occasionally.
Pamphila zabulon, Bd.-Lec.—Common in June.
Pamphila zabulon, v. hobomok.—Common in June.
Pamphila nevada, Scud.—One specimen taken. Occurs in August and September, when I have little opportunity for collecting.
Pamphila peckius, Kirby.—Common in June and July.
Pamphila mystic, Scud.—Occasionally in June and July.
Pamphila cernes, Bd.-Lec.—Occasionally in June and July.
Pamphila metacomet, Harr.—Occasionally in June and July.
Amblyscirtes vialis, Edw.—Occasionally in May.
Pyrgus tessellata, Scud.—Occasionally in July and August.
Nisoniades brizo, Bd.-Lec.—Fairly abundant in May.
Nisoniades icelus, Lint.—Fairly abundant in May.
Nisoniades juvenalis, Harr.—Occasionally in May.
Eudamus pylades, Sm.-Abb.—Occasionally in May and June.

The following are rough notes on the occurrence and capture of Diurni, etc., during 1894, about my farm in Manitoba :—

April 22nd—I first noticed hibernated specimens of V. antiopa and V. milberti flying about in the sunshine.

" 26th—In the evening I took several Noctuæ, some apparently belonging to the genus Tæniocampa, and also a dark gray moth, flying about the breaking catkins of the white poplar. Also on several evenings subsequently.

May 18th—*Lycæna Couperii* tolerably abundant, and L. pseudargiolus-neglecta just appearing.

" 23rd—*L. Couperii*, *Nisoniades juvenalis*, *brizo* and *icelus* abundant on the flowers of the Bear-berry (*Arctostaphylos uva-ursi*). At the same time I took the only specimen of *Thecla augustus* I have yet seen. *Lycæna amyntula* beginning to make its appearance.

" 27th—First noticed A. myrina.

" 28th—Phyciodes carlota and Colias eurytheme made their appearance.

" 30th—Papilio turnus, several, but not nearly so numerous as in 1893.

" 31st—I found on a small patch of prairie (on which a certain grass, the name of which I do not know, seemed abundant) several specimens of *Amblyscirtes vialis*, which I had not seen for several years. *Danais archippus* seen for the first time.

June 1st—*V. atalanta* and *Eudamus pylades* occurred.

" 7th—*Phyciodes tharos* and *Pamphila zabulon* taken.

" 9th—*Carterocephalus mandan* taken, and *Cœnonympha inornata* generally during this month and July.

" 10th—*Limenitis arthemis* first appeared.

" 12th—A single specimen of *Lycæna aquilo* taken flying on the banks of the river with "*Amyntula*," etc.
Phyciodes nycteis abundant, and also "Pratensis."

" 13th—*Argynnis lais* and *Lycæna melissa* taken in July.

" 15th—*Chysophanus epixanthe* flying over patches of knot-grass *(Polygonum aviculare)* and *Lycæna sæpiolus.*

" 21st—I saw a butterfly which I watched for some time, but was unfortunately unable to capture, which I have very little doubt was *Pyrgus centaureæ.* I have never before seen anything like it.

July 3rd—*Thecla titus* abundant, and one or two *Limenitis disippus.*

" 6th—*Thecla strigosa*, *Pamphila metacomet* and *A. cybele* noticed.

" 7th—*Satyrus nephele*, *Euptoieta claudia* and *Neonympha canthus.* Early for E. claudia.

" 14th—*Papilio asterias* and *Vanessa antiopa.* After this date I was too much engaged in farm work to do much collecting, but I noticed far fewer insects than usual, attributable to the extremely hot, dry weather we had during the latter half of July and August. *P. protodice* much less abundant than usual, and also the later forms of *C. eurytheme.* A very few *V. atalanta* were seen, and I do not think I saw a single *V. cardui*, and certainly none of *V. huntera.* The genus Grapta was conspicuous by its absence, and *V. milberti* much less numerous than usual. Several times during August, while on either the mowing machine or the binder, I noticed a *Pamphila* rise suddenly in couples, some six or eight feet into the air from the grass, and fight for a few seconds, and then drop as rapidly, like stones, back into the grass. Needless to say I was unable to identify them, but I have taken "*mystic*" about that time, and also "*nevada.*" I did not notice a single specimen of *P. tessellata* in 1894.

In addition to the above list, I watched for some time last summer, but unfortunately was unable to take, what I am almost certain was a specimen of P. centaureæ. One thing I have particularly noticed about collecting in Manitoba is the occurrence of single specimens of a genus from time to time; the most careful search in the locality of the capture failing to produce any more. The same, to a great extent, occurs with Noctuæ.

I must not omit to here publicly express my thanks to Mr. James Fletcher, of Ottawa, for the very kind assistance he has given me in identifying many of my species, and I am sure from the trouble I have given him, he will be more thankful than myself that the task is now ended.

NOTES ON MR. E. F. HEATH'S COLLECTION OF BUTTERFLIES.

BY JAMES FLETCHER, OTTAWA.

In August last, when visiting Mr. E. Firmstone Heath, of The Hermitage, near Cartwright, Man., I had an opportunity of examining his fine local collection of Lepidoptera, which consists of twelve cases of well-set and preserved butterflies and moths. Among the butterflies were some species, the occurrence of which in Southern Manitoba surprised me very much.

Mr. Heath's residence is situated in a beautiful wooded valley, and on the bank of a small winding river, the Indian name of which means the "Long River which runs crookedly." The trees on the banks of the valley, which is about a mile wide at The Hermitage, are chiefly scrub oaks *(Quercus macrocarpa)*, ash-leaved maples, aspen and balsam poplar (white and black poplar of the settlers), Saskatoon *(Amelanchier alnifolia)*, white thorn *(Cratægus coccinea)*, wild plum, a few American elms, choke-cherry, and various willows. The locality is undoubtedly a rich one, presenting a great variety of natural habitat for insects. The general character of the country surrounding the valley is a rolling grassy prairie, here and there broken by farms, and bluffs of white poplar.

This picturesque spot is about ten miles north of the boundary of the State of North Dakota, and about twenty-five miles north-east of the Turtle Mountains.

The following species in Mr. Heath's collection struck me as being of particular interest :—

1. *Papilio oregonia.*—Precisely like specimens taken in the Okanagan Valley, British Columbia, which was the most eastern locality previously recorded in Canada, nearly one thousand miles due west. It may be noted that *Artemisia dracunculoides*, the food plant of *P. oregonia* in British Columbia, also grows wild on Mr. Heath's farm.

2. *Vanessa californica.*—The occurrence of this species in Manitoba is no less remarkable than that of the last. I do not think there is any previous Canadian record east of the Rocky Mountains.

3. *Nathalis iole.*—This is very far out of its previously known range.

4. *Chionobas varuna.*—Chiefly notable for the late date of capture, namely, August; but the locality also is much farther east than previous records.

5. *Thecla strigosa.*—Of this species I have had scores sent to me for identification, from Ontario and Eastern Canada, during the last five or six years, and never saw but two specimens of the form showing the large fulvous patches on the primaries, which Mr. Scudder thinks was intended to be represented under the name "*T. liparops*" by Boisduval and Leconte. As far as I can remember, all of the Manitoban specimens of *T. strigosa* that I have seen (about 40 in number) show these fulvous blotches very distinctly, and the specimens are slightly but uniformly smaller than specimens from Ontario, etc. This would indicate, I think, that the Manitoban form is sufficiently distinct to be designated by a special name, and I suggest for it *T. strigosa*, var. *Liparops*. I have specimens from Cartwright, Winnipeg and Brandon.

6. *Thecla* ——*?* Mr. Heath has one specimen of a very fine *Thecla*, quite unlike any described American species, of which I hope he will some day obtain further specimens for description.

7. *Lycæna amyntula.*—This is the common tailed-blue, not only in Southern Manitoba, but at Winnipeg, and as far east, at any rate, as Nepigon, north of Lake Superior. The eggs are laid on the pedicels of the flowers of *Lathyrus ochroleucus*, in identically the same manner as is done by the same species in British Columbia, on the pedicels of the same species and of *Lathyrus venosus*.

SUPPLEMENTARY NOTE TO THE SATURNIANS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Since writing my paper (CAN. ENT., 263, ante*) I have been able to examine a specimen of the Asiatic *A. selene*. The moth differs from *luna*, chiefly in the pointed apices of fore wings, the outer margin sweeping inwardly in an even curve. I cannot consider this character of generic value, since precisely the same separates the South American *Eacles magnifica* from our *E. imperialis*. In the same species of certain Papilionides, a similar variation has been noted. The exterior bands appear faintly also in certain examples of *luna*, while the whiter colour is shown by the variety *Rossi*. Whether this tendency to white is reversionary in its nature, may be questioned. The tails are more developed in the Asiatic species, but (without denuding) I cannot find any neurational differences. I conclude, then, that Leach's term *Actias* is also applicable to *A. luna*. On the other hand, the European *isabellæ* seems to admit of a distinct genus. This species is confined to a limited region of the Peninsula, and its geograpical isolation has apparently preserved among its characters some which may have belonged to a more primitive type of tailed Saturnians. The American and the Asiatic species would be then nearer related, pointing to a different epoch of separation for the European form. The resemblance between the larvæ of *polyphemus* and *luna* seems to warrant the association of the genera, and justify my disposition of the groups. I take it that the members of the Attacid group: *Attacus*, *Philosamia*, *Callosamia*, are more highly specialized forms as compared with the Saturniid group: *Samia*, *Saturnia*, *Agapema*. These two groups would be nearer related in phylogenesis to each other than to the Teleid group, which stands at some little distance. Mr. Dyar writes me that in *Telea*, at the last stage, the larva shows a sparse coating of secondary hair, short and fine, most abundant at base of legs. In *luna*, on the contrary, the secondary hairs are most abundant dorsally, having enlarged ends, and are nearly entirely absen subventrally, except on the foot itself. From this fact, and that of t' e still greater reduction of the tubercles in *luna*, I am inclined to believe *Actias* the more specialized form, as compared with *Telea*; this view seems to be sustained by the moth stage and would bear out the position assigned to the genera in a linear series. It seems, then, probable that *Actias* and *Telea* represent a lateral branch of the family stem and that they have pursued to some extent a parallel development. This is shown by the greater uniformity in colour, the absence of contrasting ornamentation in the larvæ. In all stages these moths rely on protective resemblances, needed by insects so large and apparently so very helpless.

*On page 263, ante, foot-note, for "Xyloicus" read "Hyloicus."

COLEOPTERA TAKEN AT LAKE WORTH, FLORIDA—No. II.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The latitude stated in the former paper‡ should have been 26° 40′. This winter my location was six miles south from Pitt's Island, where the collecting was done last season. From February 1st to May 6th is the time included. During February and March few beetles occurred, as the temperature ranged from 52° to 74° and on one occasion fell to 27°. From the 10th to the 24th of April no collecting was done, and all but a few of the species enumerated were taken between the latter date and May 4th. The species not known to the writer to occur north of Florida are marked with a *; those extending westward around the Gulf, with a †; the others have a wide northern and western distribution. *Philonthus micans* is to be erased from the previous list, as that species does not occur in Florida, the black form of *alumnus* having been erroneously so determined.

†Pasimachus subsulcatus, *Say.*
Dyschirius sphæricollis, *Say.*
†Clivina picea, *Putz.*
Ardistomis viridis, *Say.*
Lebia abdominalis, *Chd.*
†Callida decora, *Fab.*
*Plochionus dorsalis, *Horn.*
*Apenes angustata, *Schwarz.*
†Brachynus 4-pennis, *Dej.*
Anatrichis minuta, *Dej.*
Harpalus nitidulus, *Chd.*
†Philhydrus consors, *Lec.*
Cercyon prætextatus, *Say.*
Silpha inæqualis, *Fab.*
†Colpodota pulchra, *Kraatz.*
Staphylinus tomentosus, *Grav.*
Actobius, n. s.
Lathrobium, n. s.
*Paederus obliteratus, *Lec.*
†Erchomus laevis, *Lec.*
Oxytelus insignitus, *Grav.*
Olibrus vittatus, *Lec.*
*Stilbus floridanus, *Casey.*
S. pusillus, *Lec.*
Megilla maculata, *DeG.*
†Psyllobora nana, *Muls.*
Scymnus collaris, 2 var., *Mels.*
*Languria marginipennis, *Schwartz.*
Lasconotus pusillus, *Lec.*
Catogenus rufus, *Fab.*
Laemophloeus, sp.
Cryptomorpha desjardinsi, *Guer.*
Loberus impressus, *Lec.*
Dermestes vulpinus, *Fab.*
Hololepta 4-dentata, *Fab.*
Saprinus, sp.
†Carpophilus tempestivus, *Er.*
Trogosita virescens, *Fab.*
Tenebrioides, sp.
Cyphon variabilis, var. modestus, *Lec.*
Alaus myops, *Fab.*

‡CAN. ENT., XXVI., p. 250, Sept., 1894.

*Anchaustus asper, *Lec.*
†Monocrepidius suturalis, *Lec.*
†Ludius hepaticus, *Germ.*
Glyphonyx recticollis, *Say.*
Melanotus communis, *Gyll.*
M. clandestinus, *Er.*
Chrysobothris chrysoela, *Ill.*
Photinus lineellus, *Lec.*
†Photuris frontalis, *Lec.*
Polemius, sp.
Aphodius ruricola, *Mels.*
A. stercorosus, *Mels.*
Clœotus globosus, *Say.*
Anomala undulata, *Mels.*
Euphoria melancholica, *Gory.*
Trichius delta, *Forst.*
*Leptostylus, n. s.
Hippopsis lemniscata, *Fab.*
*Spalacopsis filum, *Dur.*
*Lema conjuncta, *Lac.*
Anomæa laticlavia, *Forst.*
†Metachroma pellucidum, *Cr.*
†Dysonycha collata, *Fab.*
Epitrix brevis, *Schwartz.*
E. parvula, *Fab.*
Coptocycla bicolor, *Fab.*
C. clavata, *Fab.*
†Caryoborus arthriticus, *Fab.*
Bruchus scutellaris, *Fab.*
B. obscurus, *Say.*
Alobates barbatus, *Knoch.*
*Blapstinus fortis, *Lec.*
*B. estriatus, *Lec.*
†Tharsus seditiosus, *Lec.*
Uloma punctulata, *Lec.*
Arrhenoplita viridipennis, *Fab.*
Platydema ruficorne, *Sturm.*
P. erythrocerum, *Lapl.*
†P. subquadratum, *Mots.*
P. subcostatum, *Lapl.*
*Hypophloeus, n. s.
†Talanus langurinus, *Lec.*
*Cteniopus Murrayi, *Lec.*
Oxacis, n. s.
O., n. s. (blue).
*Mordellistena floridana, *Smith.*
*M. splendens, *Smith.*
Tomoderus interruptus, *Laf.*
Anthicus fulvipes, *Laf.*
Tyloderma variegatum, *Horn.*
T. æreum, *Say.*
Conotrachelus seniculus, *Lec.*
†Cryptorhynchus minutissimus, *Lec.*
*Baris nitida, *Lec.*
*Trichobaris insolita, *Casey.*
†Cylas formicarius, *Fab.*
*Sphenophorus apicalis, *Lec.*
*Cossonus, n. s.
Tomicus cacographus, *Lec.*
*Scolytidæ, n. g. and n. s.

The species listed number 101; of these, eight are undescribed and four undetermined. Eight species mentioned in Mrs. Annie Trumbull Slosson's list, published in the January number of the CAN. ENT., are also enumerated, namely: *Staphylinus tomentosus, Languria marginipennis, Cryptomorpha desjardinsi, Photuris frontalis, Coptocycla bicolor, Blapstinus fortis, B. estriatus,* and *Cteniopus Murrayi.* Also *Pasimachus subsulcatus, Harpalus nitidulus, Chrysobothris chrysoela,* and *Caryoborus arthriticus,* from her manuscript notes of captures at Lake Worth in December, 1894.

Staphylinidæ—Pæderus obliteratus.—This beetle is abundant in April. The species occurring on the New Jersey sea-coast, usually determined *obliteratus*, is *P. floridanus*, which has likewise the elytral punctures more or less obliterated posteriorly, but very coarse anteriorly. *P. obliteratus* has a narrower head, longer elytra, with the punctures faintly indicated anteriorly and obsolete behind. It occurs as far north as St. Augustine, to my knowledge. *Bledius punctatissimus* occurred as formerly; one of the types of this species was from Southern California, and not that of *B. fumatus*, as a dislocation by the printer in the former paper makes it appear.

Languria marginipennis.—Abundant by sweeping weeds. April.

Cucujidæ—Catogenus rufus.—The larva of this widely-distributed species is eminently a wood borer, and in Southern Florida completes its transformations in about three months. Two mature beetles, in length .22 and .45 inch, respectively, were cut, April 25th, from sea grape (Coccolobus) killed by the December frost. The young larvæ started out about two inches apart, pursuing parallel routes for 23 inches before pupating. The beetles were over an inch from the surface, and no provisions had been made for their liberation. For the first ten inches of their course their burrows were eaten from the wood just beneath the bark and packed with borings; the remainder of the burrows, also firmly packed, were in the solid wood. The larva of the small beetle had the same supply of food as that of the larger. Why the disparity in size? And why burrow the same distance?

Cryptomorpha desjardinsi. — Several examples of this graceful species were taken in April in the unfolding leaves of the Banana killed by the December frost, and in a state of semi-putrefaction. The larvæ and pupæ were seen in the cellular structure of the leaf beneath the epiderm. The Florida examples are identical in form, size and coloration with those from British Columbia.

Scarabæidæ—Euphoria melancholica occurred abundantly, March 1st, on thistles (*cirsium*)—*Trichius delta*, many examples occurred, May 1st, on the blossoms of the wild olive (*Olea americana*). It extends to the extreme south of Florida, having been taken at Key West.

Leptostylus, n. s.—This is a small species, .16 to .20 inch in length, of an ashy-gray colour, and but slightly depressed; the antennæ are conspicuously annulated; the thoracic tubercles are close to the base and in some examples acute, as in *Liopus*; the elytra are obliquely truncated

at tip, with small black dots arranged in irregular rows and with two blackish angulated lines behind the middle. It breeds in the stems of a slender cucurbitaceous vine (*Melothria pendula*) which grows over fences and bushes in dense festoons. Mr. Schwartz took this species at Bay Biscayne, and it may occur in the Bahamas and Cuba.

Leptostylus transversatus.—This species breeds in stumps and logs of the Mastich (*Sideroxylon pallidum*). The larva lives entirely in the bark, where it pupates in a cell, after the manner of a *Urographis*.

Spalacopsis linum, Duv.—This species was taken abundantly in April and in May on the dead vines of *Melothria pendula*, in the dead stems of which both larvæ and pupæ were abundant. The beetle is exceedingly slender, varying greatly in size, and in length from .20 to .60 inch. It occurs also in some of the Bahama Islands and likewise in Cuba, and is thus described by Chevrolat [Tr.]: "*Euthuorus filum*, Duv.—Filiform; head closely punctate, grayish-brown, with three obsolete pale lines; thorax linear, closely punctate, brownish-gray, with an obsolete pale line on each side and down the middle; elytra brown, variegated with maculations, especially near the suture; the apex margined, obliquely truncate and produced, longitudinally sulcate, closely and strongly punctate, interstices elevated; antennæ and feet brown. Length, 8–11 mill.; width, 1⅔–2 mill." (An. France, Series 4, Vol. II., p. 256.) Mr. Schwartz previously took this species at Bay Biscayne. Its occurrence north from Lake Worth has not been noted, but the vine in which it breeds extends around the Gulf to Texas. The pertinacity with which it feigns death is extreme, and till it moves it can scarcely be distinguished in the umbrella from the broken vines.

Hippopsis lemnistica.—Taken abundantly with the foregoing species, but it breeds in the stems of other plants or weeds besides *Melothria*. It extends westward around the Gulf and as far northward as Eastern Pennsylvania.

Caryoborus arthriticus.—This species, as is known, breeds abundantly in the seeds of the Cabbage Palm (*Sabol palmetto*). From about one quart of the berries placed in a covered paper box I obtained more than 100 examples. This species, however, breeds in the seeds of other trees, as I raised once several examples from the seeds of the Coffee tree (*Gymnocladus Canadensis*).

Platydema subquadratum, Mots.—While the Florida and Arizona examples are considered as belonging to one species, yet they have a

distinct facies, and the under-side is differently coloured; those from Florida being luteous brown beneath, while the Arizona examples are bright rufous.

Hypophlœus, n. s.—Three examples were beaten from *Melothria* vines, but whether they bred in them or in the cedar posts which supported them is not known, and the matter is mentioned to call the attention of future collectors. This species is narrower than *glaber*, which occurs also; the elytra are finely but distinctly punctured in close rows.

Talanus (*Dignamptus*) *langurinus* and *stenochinus*.—These two names represent the extremes of one species (Horn). Dr. Leconte having only one example of the latter and two or three of the former before him, and knowing nothing of the graduating intermediates, or the history of the species, found enough of differential points for two species. It was beaten abundantly from the dead vines of *Melothria*, in which it probably breeds, though I did not find larva nor pupa. It varies in length from .15 to .40 inch, which is no greater difference than is found in some other species, as *Spalacopris filum*, *Catogenus rufus*, etc. The colour of the types is represented as "black with a bluish gloss," and "black with a slight metallic gloss." All the examples taken by me, and others in my collection from Bay Biscayne and from Louisiana, are from light to dark castaneous. It requires a little faith to see any great resemblance to a *Languria*. Dr. Horn names the species as a whole *langurinus*.

Cryptorhynchus minutissimus, var.—This species was beaten in some abundance from both living and dead vines of *Melothria*, in which it probably breeds. The typical examples of this species in my collection from Louisiana, and also one taken at Lake Worth on another plant, have the thorax and elytra beautifully ornamented; but this variety is sordid brown, with the apical third of the elytra luteous. Some one hereafter may possibly describe it as a new species.

Trichobaris insolita, Casey. This species was taken abundantly in a patch of a species of ground cherry (*Physalis*), April 10th. None occurred afterwards nor elsewhere, though *Physalis* is abundant. It probably breeds in the stems of this plant, like *trinotata* does in the potato. I found a coleopterous larva in one of the plants, but no pupa, and so can not write with certainty.

Cylas formicarius.— Three examples were taken on the ocean beach from a rough, prostrate *compositous* plant, growing in mats on the sand. The species is said to depredate on the sweet potato, but in this

case there were no sweet potatoes or other convolvulaceous plants within half a mile. Many times I accompanied the gardener for sweet potatoes, but failed to find this species either above or under the ground.

Rhyncophorus cruentatus.—This species breeds in the dying trunks or stumps of the Cabbage palmetto ; before pupating the larva forms an excavation, in which it constructs a cocoon in which to pupate ; this cocoon is from an inch and a-half to two inches in length, its walls being over one-sixteenth of an inch in thickness, composed of fibre, cemented with some glutinous secretion.

Cossonus, n. s.—Under the bark of a dead limb of the Rubber tree *(Ficus aurea)* five examples were taken. The basal half of the elytra, metasternum and abdomen are rufous. Length, .12-.14 inch.

Scolytidae.— An undescribed species belonging to a new genus *(Schwartz)* occurs in the dead or diseased bark of the *Ficus* in incredible numbers. It breeds entirely in the bark, and it is not possible to trace its galleries. Length, .04-.05 inch.

NOTES ON THE INSECT FAUNA OF SOMERSET CO., MAINE.

BY PHILIP LAURENT, PHILADELPHIA.

The following notes and observations were made during a two-weeks' stay in this county, ending on August 29th. The greater portion of our collecting was done in the neighbourhood of King & Bartlett Lake, and along the road leading out to Eustis. This section of Maine, if not the entire State, is anything but an "entomologist's paradise." The country is mountainous and covered for the most part with a dense growth of spruce, pine, birch, etc. Very little land in the entire county is under cultivation, so that those insects which we naturally look for in such places are almost entirely wanting. Many beautiful lakes are to be found in this part of Maine, but here again the entomologist is doomed to disappointment, as the water of the lakes is of an icy coldness, and very few aquatic insects are seen. The nights are invariably cold and but few insects are attracted to light. In a heavily-timbered country, such as we find in Somerset Co., Maine, it would naturally be supposed that the fallen trees would yield an abundance of insect life, particularly Coleoptera. A search of two hours, in which I overturned many dead trees and removed the bark from many others, resulted in the finding of exactly eight specimens of Coleoptera, and common species at that. Collecting with the umbrella and beating-net was a waste of time, as little or nothing rewarded our efforts. *Cicindela*

longilabris, Say, was found in abundance on the road to Eustis by Dr. Skinner, during his visit to this part of Maine in 1894; but this year only three or four specimens were observed. The only other Cicindela seen was *12-guttata*, Dej., which was quite common. A specimen of *Monohammus marmorator*, Kir., was the best capture in the line of Coleoptera. The following Coleoptera were also captured: *Tachys nanus*, Gyll.; *Pterostichus honestus*, Say; *Coccinella trifasciata*, Linn.; *Hyperaspis fimbriolata*, Melsh.; *Dicerca tenebrosa*, Kir.; *Ellychnia corrusca*, Linn.; *Aphodius fimetarius*, Linn.; *Trichius affinis*, Gory; *Rhagium lineatum*, Oliv.; *Monohammus confusor*, Kir.; *Monohommus scutellatus*, Say; *Doryphora 10-lineata*, Say; *Luperus meraca*, Say; and *Meloe angusticollis*, Say. In the capture of Lepidoptera we were somewhat more successful; not that this order was in any way better represented, but in the fact that some of our captures were new to our cabinets. There was not a lepidopterous insect observed of which we could say it was common. *Pieris rapæ*, Linn., outside of the small kitchen garden, was extremely scarce. *Grapta faunus*, Edw., possibly the commonest of all the Lepidoptera observed, was by no means very abundant, as only eighteen specimens were captured during our two-weeks' stay, and then only after a persistent effort on our part to secure them. *Grapta gracilis*, G. & R., a very desirable species, of which we secured nine specimens, was one of the few good things secured in the butterfly line. The small white aphis on which the larva of *Feniseca tarquinius*, Fab., is said to feed, was very plentiful on the branches of the black alder, but of Feniseca itself we only saw one or two specimens. On both occasions when I visited the alders it was after a heavy rain, and this may have had something to do with the scarcity of Tarquinius. Following is a list of Lepidoptera secured during our two weeks of collecting: *Argynnis atlantis*, Edw.; *Argynnis myrina*, Cram.; *Phyciodes tharos*, Dru.; *Grapta faunus*, Edw.; *Grapta gracilis*, G. & R.; *Grapta progne*, Cram.; *Grapta j-album*, Bd. & Lec.; *Limenitis arthemis*, Dru.; *Limenitis disippus*, Gdt.; *Chrysophanus hypophlæas*, Bdv.; *Pieris rapæ*, Linn.; *Colias philodice*, Gdt.; *Papilio turnus*, Linn.; *Arctia virgo*, Linn.?; *Mamestra renigera*, Steph.; *Hadena arctica*, Bdv.; *Hadena modica*, Gn.; *Caradrina multifera*, Walk.; *Cirroedia pampina*, Gn.; *Scoliopteryx libatrix*, Linn.; *Pseudaglossa lubricalis*, Geyer; *Therina fervidaria*, Hbn.; *Cleora semiclusaria*, Walk.; *Triphosa dubitata*, Linn.; *Petrophora prunata*, Linn.; *Pinipestis Zimmermanni*, Grt.; and *Crambus vulgiva-*

gellus, Clem. Some little collecting was done in the other orders, and among the Hymenoptera the following have been kindly identified by Mr. Wm. J. Fox: *Urocerus flavicornis*, Fab.; *Urocerus albicornis*, Fab.; *Ichneumon grandis*, Brull.; *Paniscus glaucopterus*, Linn.; *Vespa maculata*, Linn.; *Vespa germanica*, Linn.; *Bombus bifarius*, Cress.; *Bombus vagans*, Sm.?; *Pompilus tenebrosus*, Cress.; *Odynerus leucomelas*, Sauss; and a species of Halictus not yet identified. Of the other orders the greater part of our captures are as yet unidentified. Dr. Wm. Hughes and Dr. Henry Skinner, my companions on this trip, rendered me much valuable assistance in securing specimens.

NOTES ON PSYCHODA.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Mr. Alex. D. MacGillivray has sent me some Psychodidæ from Ithaca, N.Y., for names.

Psychoda Slossonæ, Will.

One male (June). The wings are clothed with blackish hair, and with two broad irregular white bands. The fringe on the posterior margin is blackish (in *superba* whitish); the abdomen clothed with white hairs (in *superba* with black); the legs are paler and with more white hair than in *superba;* and the white hair on head and thorax is not as long nor as dense as in *P. superba.* A female (Aug.) which is larger and more thickly clothed with white hair is, perhaps, the same as Williston mentions, and is, I think, the female of this species.

Psychoda albitarsis, n. sp.

Wing moderately broad, tip not very acute, clothed with blackish hair; some specimens show a patch of more dense hair on the middle near the costal margin; the fringe is black except at the tip, where it is white; behind the fringe is over four times as long as the width of a cell; head, thorax and abdomen densely clothed with black hair; legs with dense black hair, except the tarsi, which are white or pale yellowish. Antennæ very short, pale, with whitish hair. Length of wing, 2.4 mm.

Differs from *P. nigra* by white apical fringe, and white tarsi and less pointed wing; from *P. marginalis* by larger size, white tarsi and black haired body. Eight specimens, June and July, on *Rubus odorata* at Ithaca, N.Y.

Psychoda alternata, Say.

A few specimens of this species from Ithaca, N.Y., are smaller than those from Long Island.

Psychoda cinerea, Bks.

One specimen from Ithaca of this species is not quite as dark as the types.

NOTE ON THE LARVA OF HEMILEUCA CALIFORNICA, WRIGHT.

BY HARRISON G. DYAR, NEW YORK.

In CAN. ENT., 1894 (Vol. XXVI., p. 293), Prof. G. H. French described the early stages of this species, but failed to get the larvæ past their second moult. Prof. French kindly sent me eggs, and I have raised the larva through all its stages. It is, however, exactly like the normal *H. maia*, already described by Prof. Riley and Dr. Lintner, as we might expect from the position to which the moth has been assigned. I will, therefore, not take up space to redescribe the several stages in detail. The characters of the tubercles and setæ are such as I have described for the Hemileucidæ (Trans. N. Y. Acad. Sci., XIV., 55), and are the same as in Pseudohazis. In my account of the genus (Psyche, VII., 91), the statements about the arrangement of the setæ are inaccurate, owing to insufficient amplification (only a lens was used). I add, therefore, figures of the thoracic and abdominal setæ, stages I. and II. of Hemileuca, showing the true arrangement, and these may be considered to stand also for Pseudohazis.

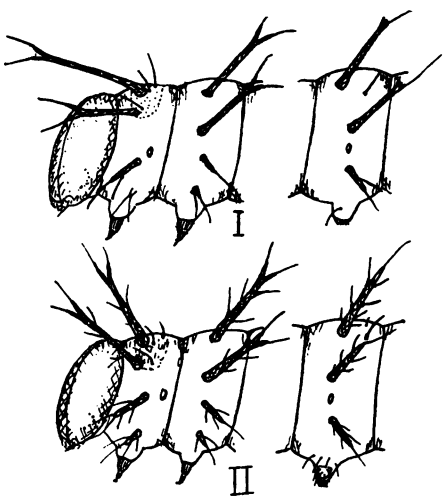

FIG. 23.

It will be noticed that stage I. (Fig. 23) represents a primitive first stage, with tubercles iv. and v. consolidated and all the tubercles except three on the cervical shield and tubercle ii. on abdomen hypertrophied. In stage II. the tubercles are converted into elongate warts by the addition of setæ, but no sub-primary tubercles appear. A few secondary setæ may be distinguished, and these become abundant in later stages, parallel with the increase in number of spines on the elongated warts. The peculiar shortening of wart i. takes place in stage III., and hence is not shown here.

BOOK NOTICES.

AN ATTEMPT TO CORRELATE THE RESULTS ARRIVED AT IN RECENT PAPERS ON THE CLASSIFICATION OF LEPIDOPTERA. By James William Tutt, F. E. S.

This paper very instructively and readably puts together the conclusions attained by Comstock, Dyar, Chapman and Hampson on the subject, which is one which has lately received gratifying attention. It positively rains classifications! Hardly have I mailed off the Systema when Dr. Packard sends me a "New Classification," and it must be confessed that printers' ink has not been spared at the birth of the New Lepidopterology. Therefore this paper, in the Trans. Ent. Soc., of London, Pt. III., for Sept., 1895, by Mr. Tutt, comes opportunely and affords useful reading. Mr. Tutt states at the outset, that this paper is not offered in a spirit of adverse criticism to any one of the particular lines indicated and worked out at length by these various authors. But, on the whole, the neurationists come off a little the worse and for the apparent reason that their use of a single organ, with a limited field for the expression of its development, is open to the fatal objection that the same peculiarities are offered along different lines of descent. That this is actually the case appears from the result which Dyar, on occasion, obtains from the larval tubercles as compared with that obtained by Comstock from the wings. Undoubtedly the wings show evolution and indicate phylogenetic lines, but ultimate peculiarities of venation are not decisive of affinity in all cases. The time has perhaps gone by when a moth is excluded or admitted into a family on the sole ground that the costal vein merges with the subcostal, or springs free from base of the wing, or is separate a little way and then touches the subcostal at a certain point. "It is also evident," says Mr. Tutt, "that the results of the various systems, whether based on larval, pupal, or imaginal characters, must be compared, and the sum total of evidence brought together, if a satisfactory result is to be obtained." Towards the comprehension of the points of the various systems, Mr. Tutt's digest will certainly contribute.

Dr. Packard's New Classification seems, on reflection, exclusive of Prof. Comstock's. Upon the mouth parts of a smaller moth, referred not long ago to the genus Micropteryx, Dr. Packard founds a suborder, Lepidoptera laciniata, and refers Micropteryx and Hepialus into the other suborder, Lepidoptera glossata, which contains thus so nearly the whole of the order that it might be almost as well to refer the Eriocephalidæ to the

Trichoptera and be done with it. The objection that Comstock's Frenatæ includes many Lepidoptera without a frenulum is somewhat paralleled by the fact that some of Dr. Packard's Lepidoptera glossata (Fabricius's term for the order) have no tongue. The difficulty of "combining" these two systems lies in the fact that different organs are employed. Dr. Packard's paper closes with a geneælogical tree at which my old friend, Mr. W. H. Edwards, if he is still standing on his rock and is not washed away by Dyarian waves, will no doubt lift his hands in astonishment. Dr. Packard has virtually abandoned the old Latreillean camp and joined the ranks of the new school.

In a far wider sense than as a correlator of contending systems, Mr. Tutt merits respect for his untiring industry and his success in raising the standard of scientific Lepidopterology in England; I might almost say in Europe, for the study itself has been in some danger of following the objects of the study, into the useful hands of the dealers in insects. With ever fresh enthusiasm and all the power of expressing himself clearly, Mr. Tutt combines both point and poetry, so that to read one of his discussions on synonymy is a pleasant task. The student, whether objectively of science, or subjectively of nature, cannot fail to be benefitted by Mr. Tutt's writings.

A. RADCLIFFE GROTE, A. M.

THE BUTTERFLIES OF NORTH AMERICA, with Coloured Drawings and Descriptions, by W. H. Edwards. Third Series, Part XVI. Houghton, Mifflin & Co., The Riverside Press, Cambridge, Mass.

Though nearly a twelve-month has gone by since the preceding Part was noticed in our pages, we could well afford to wait with patience for another issue, when our author rewards us with so much that is remarkably interesting, as well as valuable, regarding the life-histories of some hitherto little known Butterflies.

The first plate, which as usual is exquisitely drawn and coloured, depicts the female of *Parnassius Smintheus*, Doubl.-Hew., and both sexes of the variety *Hermodur*, Hy.-Edw., together with the egg, larva in all its stages, chrysalis, last segments of the male butterfly, and many highly magnified details. After giving a description of the various stages of the insect, the author relates many most interesting facts regarding the life and habits of the butterfly, which have taken expert observers in the

States of Colorado, Montana, and Washington, no less than twenty years to accumulate. The account is concluded with a description of the formation of the extraordinary pouch or keel which is to be seen beneath the abdomen of the females of various species of Parnassius. That this should be formed by the male is one of those strange marvels that render the careful study of the lives of our Butterflies so interesting and attractive.

The second plate depicts both sexes of *Satyrus Charon* and the male of its variety *Silvestris;* also the egg, the various stages of the larva, the chrysalis, and many details. The imago and the several preparatory stages are described, and a short but interesting account is given of the habits of the butterfly and the rearing of the larvæ.

On the remaining plate are figured the egg, three stages of the larva with details, and both sexes of the imago of the British Columbia species *Chionobas Gigas*, Butler. After describing the preparatory stages so far as known, the author relates the differences in appearance and habitat between this species and *Californica* and *Iduna*, which are frequently confused in collections. *Gigas* is shown to be confined, so far as is yet known, to Vancouver Island, where the male frequents the tops of the highest mountains, the female being usually found much lower down. *Iduna* inhabits the slopes of the evergreen redwood forest in North-eastern California on the Pacific Coast; and *Californica*, the hot, arid regions of East Oregon, Washington, and the semi-desert portion of North-east California. "*Gigas* is semi-arctic, living amid the cold, dark fir forest; *Iduna* is temperate, living in the mild, dark redwood forest; *Californica* is semi-tropical, living in open, dry, warm glades in the 'bush-land,' on the border between the forest and the open plains. *Gigas* alights on bare rocks; *Iduna* on green twigs; *Californica* on dead or dry grass." But we must refer the reader to the book itself for all the interesting particulars regarding these strange Butterflies.

The wonder to us is that so few Entomologists subscribe to this magnificent work. The Parts are issued at such long intervals that the cost is very light; those who have secured them know what a treasure they possess and how highly they prize it.

Mailed November 4th, 1895.

THE PLUM-TWIG GALL-MITE (PHYTOPTUS PHLOEOCOPTES, NAL.)

The Canadian Entomologist.

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THE PLUM-TWIG GALL-MITE.

Phytoptus phlœocoptes, Nalepa.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In January, 1895, I received from a fruit grower at Industry, Pa., several plum-twigs which were badly infested with what was to me a new pest. Two of these twigs are shown, natural size, on the accompanying plate. It will be seen that a ring of small, sub-spherical excrescences encircles the base of each bud and also the bases of two short shoots. The correspondent wrote that he had 400 trees badly infested, and a majority of the plum trees in his neighborhood were affected. The Damsons seem especially subject to attack, but all varieties suffer more or less.

The excrescences were then of a dark brown colour, with a slight reddish tinge. Usually a slit-like opening could be distinguished on the surface. Upon carefully cutting through one of the excrescences, I was surprised to find a cavity in the interior that was packed nearly full of very minute whitish creatures, which proved to be four-legged mites or Phytoptids. Thus, these excrescences were the galls formed by the mites, and in which they were then hibernating. There were hundreds of the mites in each gall and all of them in a dormant condition. Thus, each twig was harbouring thousands of the little creatures. The fleshy portion of the galls, between the cavity and the outer skin, is of a dark magenta colour. The galls vary in size, some of the larger ones containing two or three cavities.

But little is known of the life-history of this curious gall-mite. The correspondent writes that the mites also live in the galls during the growing season. They probably leave the galls in which they hibernate and form new galls in the summer. On several twigs I found a ring of old, dry, deserted galls below a ring of inhabited galls.

Having ascertained the nature of the pest, I ransacked the literature for records of similar attacks by gall-mites. In Insect Life, Vol. I., p. 343, is recorded some correspondence which Dr. Riley had in January,

1888, with a fruit grower at Marlborough, N. Y., regarding what was doubtless this same Plum-twig Gall-mite. In this instance the galls also occurred along cracks on the bark of larger limbs, and in close connection with the Black Knot fungus, which was, of course, accidental. Again in 1891, Dr. Riley (Insect Life, Vol. V., p. 17) records a small mite as injurious to Damson plum trees at Berlin Cross Roads, Ohio. This was probably the mite under discussion. These are the only records I have found in American literature of any mite making galls on plum-twigs.

There has recently appeared in the European literature three admirable and exhaustive papers on the Phytoptidæ, by Dr. Alfred Nalepa [Sitz. der Math.-Natur. Classe der kais. Akad. der Wiss., Abtheil. I., Vol. 96 (1887), pp. 115–165 ; Vol. 98 (1889), pp. 112–156 ; Vol. 99 (1890), pp. 40–69]. Each article is accompanied by several finely executed plates. *Luckily, I had access to Dr. Nalepa's work, and I found that but one Phytoptid had been described which lived in galls on the twigs of plum trees. In Vol. 99, p. 54, he describes and figures this mite as *Phytoptus phlœocoptes*. In figure 2, I have reproduced (photographically) one of Dr. Nalepa's figures of the mite ; it is the female and is magnified 450 diameters. The mites in the galls were very similar to, if not identical with, this European species. The only noticeable difference is in the shape of the body. The Pennsylvania mites are shorter and wider, but this may be quite possibly due to their being in hibernation and dormant. The European species was first described and figured as *pruni*, by Amerling, in 1868.

The mites could have been easily introduced into this country on plum stock, but the correspondent writes that his trees were grown in his vicinity "and are known as sucker-growth trees." If our mite is identical with the European species, and it probably is, the pest was introduced into this country some time previous to 1887, and it is now present in New York, Ohio, and Pennsylvania.

The fruit grower informs me that his trees are thrifty, but the fruit is undersized. So many thousands of the little creatures working at the

*Dr. Nalepa puts our knowledge of the Phytoptidæ on a scientific basis. He rightly discards all previous descriptions of the mites as inadequate and not definite enough for the determination of any species. He gives new detailed descriptions with excellent figures ; and the species are renamed, usually with new names, but sometimes the old names are retained, as in the case of the Pear-leaf Blister-mite, which he calls *Phytoptus pyri*, n. sp. We should thus write *pyri*, Nalepa, instead of *pyri*, Scheuten. Dr. Nalepa's work should be in the hands of every one interested in the Phytoptidæ.

bases of the buds must greatly lessen the vitality of the whole tree. When the mites occur as numerously as shown in the figures, they must prove a serious pest; and, with our present scanty knowledge of their life-history, they will prove a hard foe to combat. So far as we know, the mites are securely protected in their gall-homes during the whole year. Possibly there may be a few days, when they are leaving their galls to form new ones, that they could be hit with an insecticide. It is doubtful if kerosene emulsion will penetrate the galls, but it is worthy of a trial on a few trees during their dormant period; dilute the emulsion with only three or four parts of water, and make it by the Riley-Hubbard formula. The only other suggestion I can now make is to prune the trees as closely as possible, taking pains to cut out as many gall-bearing twigs as practicable, and to burn all prunings. As most of the galls are on the twigs, millions of the mites could be destroyed in this way.

I am indebted to the "Rural New Yorker" for the use of the figures of this mite and its work.

PARTIAL PREPARATORY STAGES OF SOME MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Catocala Minuta, Edw.

Full-grown larva.—Length about one inch. As in most Catocala larvæ, seven stripes, the dorsal gray, lilac tinted; the next blackish-gray, paler on the middle of the joints; the next about the same colour, but tinted with the reddish-orange that forms the broad bordering lines between the stripes; the next also blackish and below this dull orange. The bordering lines on the back whitish, distinct white on the folds; lateral fringe orange tinted. Piliferous spots orange, the posterior pair to each joint more prominent than the anterior pair; the anterior pairs on joints 6 to 8 paler. The posterior part of joint 9 elevated and white between the spots; back of the elevation, and reaching down to the legs, orange tinted black. Head dull lilac-gray, mottled with white, a blackish patch above on each side and in front two black spots on each side. Venter yellowish-white, with black patches in centre of joints.

Chrysalis.—Length, .65 inch; diameter of thorax, .23 inch; tongue- and wing-cases extending back to posterior part of 5, the tongue-case as far back as the wing-case; tapering back from 5; abdominal joints very shallowly punctured, the punctures scarcely perceptible with the lens;

wing-cases much smoother than usual; cremaster hooks—two large ones at the tip of segment, and several small ones from near the base of these and some at a little distance from them. Colour chestnut-brown, covered as usual with a white powdery secretion. The puparium a case of leaves thinly lined with silk.

Pupal period, 20 days; food plant, Honey Locust.

Agrotis brocha, Morr.

Egg.—Diameter, .03 inch, height the same; blunt conical, tapering abruptly from near the base to a rounding base; longitudinally striated, 30 of these reaching the micropyle, about 60 of these striæ in all; marked with cross striæ, but these not prominent; centre of micropyle a round, slightly elevated piece. Colour various; some gray, some whitish blotched irregularly with red, the blotching being mostly a spot on the micropyle and a ring below. Duration of this period, 9 days.

Young larva.—Length, .07 inch; cylindrical. Colour of body pale smoky-white; head black; piliferous spots moderate, a white or pale hair from each. Duration of this period, 7 days.

After first moult.—Length, .15 inch; colour pale greenish-brown; head black; piliferous spots small, black; a small cervical shield. In confinement, ate clover and radish leaves.

Apatela spinigera, Guen.

Mature larva.—Length, 1.20 inch; when crawling, nearly cylindrical; with eight rows of tubercles, the lateral ones very small; the dorsal pair on joints 3 to 7 rather large, with the tallest on 3 and gradually diminishing back; joint 12 prominently elevated, the elevation tipped with a pair of tubercles, with a pair of small ones in the front part of the elevation, each tubercle bearing a single long and several short hairs. Colour bright green, the lateral tubercles scarcely discolouring the sides, slightly yellowish-green; a dorsal dark reddish-purple stripe that is nearly as wide as the head on the anterior part of 2, about half as wide on 3, narrow on 4 to 7, expanding in two ellipses on 8 and 9, the rest of the way narrow. From 2 to back of tubercles on 3 the stripe is bordered each side by clear white, coloured a little with green on 8 and 9, with a faint greenish line running through the centre of the stripe. Head rosy-red, whitish on the sides, with three more or less complete longitudinal rows of black spots. Feet and venter green.

Food plant, apple. Hibernated in the pupa, which was not described.

CURIOUS BEHAVIOUR OF EUDAMUS PYLADES LARVA.

BY H. H. LYMAN, MONTREAL.

When out on a short visit to Ausable Chasm, June 29th to July 1st, I noticed, on June 30th, a female of this species ovipositing, and secured three eggs. These eggs hatched in due course, one about a day in advance of the two others. The first larva was placed on a clover leaf in a tin-topped jelly glass, but refused to feed and dried up. I then arranged a homeopathic vial of water in a wine glass, with earth to steady it, and a few leaves of clover passing through a hole in the cork into the water, and placed the two other newly hatched larvæ upon the leaves. One immediately set to work constructing its nest, but the other seemed lazy and not inclined to make a nest for itself, or share in the construction of the other. The nest was soon complete, and the occupants hidden from view. What tragedy took place within that nest I know not, but at the first moult only one caterpillar remained, and I thought that possibly the energetic one had lost all patience with his lazy brother, and had eaten him up. The dates of the first three moults were not recorded, but the fourth one occurred on 3rd of August. The caterpillar was apparently mature by the 12th or 13th, and had left the food plant and spun some silk on the gauze top of the glass cylinder which I had placed over the wine glass, stretching several strands of silk from the gauze to the glass. I was leaving home on the 14th for a holiday at the seaside, and as I had a whole menagerie of other larvæ to take with me, and thought that this caterpillar was just going to spin its cocoon, and that disturbing it to take it with me would be a mistake, I left it behind. On my return, twenty-two days later, I found it apparently in exactly the same place as I had left it, though, of course, it may have crawled all over the cylinder during my absence, and it was still alive, though somewhat shrunken from its long fast. I immediately supplied fresh leaves in the small vial of water, and, taking the gauze from the top of the cylinder, arranged it so that the back of the larva was resting on the clover leaves, but it would not feed, and so, after a day or two, I replaced the gauze on the cylinder. The caterpillar then crawled down to a position near the base of the cylinder, where it rested for two or three days longer, and then was found dead on the window-sill, on which the cylinder was standing, having lived without food for fully four weeks in warm summer weather.

ENTOMOLOGICAL COLLECTIONS OF THE U. S. NATIONAL MUSEUM.

The staff of the Department of Insects of the U. S. National Museum at Washington has been reorganized, as a result of the sad death of the former Honorary Curator, Professor C. V. Riley.

The reorganization has been effected by the appointment of Mr. L. O. Howard, Entomologist of the U. S. Department of Agriculture, to the position of Honorary Curator of the Department of Insects; of Mr. Wm. H. Ashmead, to the position of Custodian of Hymenoptera; and Mr. D. W. Coquillett, to the position of Custodian of Diptera. All museum custodians are honorary officers. Mr. M. L. Linell will remain as general assistant to the Honorary Curator.

The Department is at present in excellent working condition. It contains a very great amount of material in all orders, and in many unusual directions surpasses any collection in the country. Among others the following are of especial interest :—

(1) The large collection, in all orders, of the late Dr. C. V. Riley.

(2) All of the material gathered during the past eighteen years by correspondents, field agents, and the office staff of the Division of Entomology, U. S. Department of Agriculture.

(3) The greater part of the collection of the late Asa Fitch.

(4) The large collection, in all orders, of the late G. W. Belfrage.

(5) The collections in Lepidoptera and Coleoptera made by Dr. John B. Smith down to 1889, together with the types of the Noctuidæ since described by Dr. Smith.

(6) The collection of Lepidoptera of the late O. Meske.

(7) The collection of Lepidoptera of G. Beyer.

(8) The collection of Coleoptera of M. L. Linell.

(9) The bulk of the collection, in all orders, of the late H. K. Morrison.

(10) The collection of Diptera of the late Edward Burgess.

(11) The type collection of Syrphidæ made by Dr. S. W. Williston.

(12) The collection of Ixodidæ of the late Dr. George Marx.

(13) The collection of Myriopoda of the late C. H. Bollman.

(14) Sets of the neotropical collections of Herbert Smith.

(15) The collection of Hymenoptera of Wm. J. Fox.

(16) The collection of Tineina of Wm. Beutenmuller.

(17) The large Japanese collection, in all orders, of Dr. K. Mitsukuri.

(18) The African collections, in all orders, of Dr. W. S. Abbott, Wm. Astor Chanler, J. F. Brady, the last "Eclipse" expedition to West Africa, and of several missionaries.

(19) The large collection from South California of D. W. Coquillett, in Coleoptera, Hymenoptera, Lepidoptera, and Orthoptera.

(20) The Townend Glover manuscripts and plates.

In addition to this material there are minor collections, which have been the result of the work of Government expeditions, or are gifts from United States Consuls, and many private individuals.

This enormous mass of material is being cared for by the active and honorary force of the Department, and the perpetuity of the collection is assured. The National Museum building is fireproof, and this, together with the fact that it is a national institution, renders the Department of Insects perhaps the best place in the United States for the permanent deposit of types by working specialists in entomology, and for the ultimate resting-place of large collections made by individuals.

The policy of the Museum at large, with regard to the use of its collections by students, is a broad and liberal one. Students are welcome in all departments, and every facility is given to systematists of recognized standing.

NOTES ON APHILANTHOPS.

BY CARL F. BAKER, FORT COLLINS, COLO.

Within a short time two very interesting species (*q notatus*, Ash., and *taurulus*, Ckll.) have been added to this genus. I have lately received another new species from Mr. Chas. Palm, of New York City, collected in S. W. Utah, which is even more interesting than the two above mentioned. I describe it herewith.

Aphilanthops utahensis, n. sp.—Male [illegible] region of [illegible] segments [illegible] somewhat [illegible] very dense on [illegible] pointed [illegible] lobe [illegible] yellow; flagellum [illegible] punctures [illegible] cenous [illegible] above [illegible]

scutellum, yellow. Wings normal. Fore and middle femora beneath at tip, hind femora above at tip, and all the tibiæ outwardly, yellow. Abdomen somewhat more remotely punctured than the head, feebly pubescent. Dorsal segments 1-5 with yellow bands; that on third interrupted at the middle, the two portions inwardly pointed; that on first strongly bent forward. Sixth segment with a median hemispherical yellow spot on posterior half. Seventh segment above not characteristic in structure. Ventral segments with punctures very coarse and remote; second, third, and fourth, with strong yellow bands, all slightly interrupted medially.

Hab.—S. W. Utah. (Chas. Palm.)

This pretty and very distinct species is as near *4-notatus* as any of the species of *Aphilanthops*, though it is as widely separated from all others by the tridentate clypeus as is *4-notatus* by the peculiar structure of the last dorsal segment.

The female of *4-notatus*, which has never been described, differs most noticeably from the male in size, the length being about 11 mm.

The North American species of the genus may be separated as follows:—

Clypeus strongly tridentate; ground colour throughout rufous; metathorax without spots ..... *utahensis.*

Clypeus evenly rounded; ground colour of at least head and thorax black.

Last dorsal segment rectangular and strongly concave; clypeus margined with yellow; legs rufous; metathorax with a yellow spot on either side; ground colour of three basal segments of abdomen rufous ..... *4-notatus.*

Last dorsal segment pointed, strongly convex; legs yellow and black; ground colour of abdomen black.

Bands of abdomen broad, continuous; clypeus yellow; metathorax with a yellow spot on either side; size small ..... *laticinctus.*

Bands of abdomen, at least the first three, interrupted at middle; size large.

Clypeus and part of face above yellow; antennæ mostly rufous; metathorax with a yellow spot on either side ..... *frigidus.*

Clypeus, face and antennæ, black; metathorax without spots ..... *taurulus.*

THE LARVÆ OF THE NORTH AMERICAN SAW-FLIES.

BY HARRISON G. DYAR, PH. D., NEW YORK.

It appears from a reference to the literature, that the larvæ of less than 25 per cent. of the Tenthredinidæ listed as inhabiting the north-eastern United States and Canada have been described. Of the Western species, scarcely half a dozen are known.

It seems desirable that something should be done to increase interest in this neglected subject, and I have thought it well to prepare a synoptic table of the larvæ already known, to facilitate the recognition of specimens and better indicate those as yet undescribed, and therefore needing study.

In the following table the Western species are excluded. If, by good fortune, any student of this group should arise there, he would find the field practically clear.

To the eighty odd species described I have added about forty well-marked forms, the diagnoses being taken from my notes on larvæ not yet reared; but as I intend to determine them as rapidly as possible, I have thought it best to include them, indicating them by marks to correspond with my notes.

The species of Schizocerus are omitted. *S. fumipennis* is Californian, and the two sweet-potato feeders, *S. ebenus* and *S. privatus*, are so imperfectly described that I cannot place them.

I shall be grateful to receive notes of any corrections or additions and the names of any of the undetermined forms.

RECOGNITION TABLE FOR THE KNOWN SAW-FLY LARVÆ OF THE NORTHERN ATLANTIC STATES.

1. { Abdominal feet present on joints 6–13; rarely rudimentary or absent in leaf-mining forms 2
   { Feet on joints 6–11, either present on joint 13 or rudimentary. Cocoon compact, dark brown 27
   { Feet on joints 6–10, or slight on joint 11; cocoon reticular, of yellow silk 48
   { Without abdominal feet. A pair of long antennæ on the head and jointed processes on the last segment 53

2. Sitting flat on the surface of the leaf; slug-like 3
   Sitting on the needles of pine 18
   Sitting on the edge of a leaf or curled spirally 20
   Leaf miners 26

3. Shining, sticky, slug-like 4
   Smooth, not shining 10

Body with rough points or spines.....15
Body with forked processes.....16
4. Large, blackish (Prunus, etc.).....*Eriocampa cerasi.*
Smaller, not blackish.....6
6. Sides of thorax orange tinted.....7
Sides of thorax not orange tinted.....8
7. Head black.....*Eriocampa fasciata.*
Head pale.....*Monostegia quercus coccineæ.*
8. Head pale.....9
Head black.....*Caliroa obsoleta.*
9. On Quercus, usually gregarious.....*Monostegia quercus-albæ.*
On Prunus, scattered.....*3S**
10. Head more or less black.....11
Head pale.....14
11. Body high, larvæ robust.....12
Body slender, as usual.....13
12. White and yellow; on Fraxinus.....*Monophadnus barda.*
Gray and yellow, spotted with black; on Polygonatum (Solomon's seal).....*4D.*
13. With slight angles or rudimentary points on joint 2; a faint blackish band; on Betula.....*Taxonus multicolor.*
Smooth, waxy white; on Epilobium.....*6M.*
14. Yellowish, immaculate; on Rosa.....*Monostegia rosæ.*
With a pruniose coating; on Alnus.....*Poecilosoma inferentia.*
15. Head pointed; on Betula, etc., etc.....*Strongylogaster pinguis.*
Head round; on Spiræa.....*Blennocampa spirææ.*
Head black; on Vitis.....*Blennocampa pygmæa.*
16. Head green; on Rubus.....*Monophadnus rubi.*
Head black spotted; on Quercus.....17
17. Green.....*Periclista emarginata*†
Dorsum purplish.....*Monophadnus diluta.*
18. Without spots; head black; on Abies.....*Lophyrus abietis.*
Similar (?) to the preceding; on Pinus.....*Lophyrus pini-rigidæ***
With angular black spots.....19
19. Head black, no subventral spots; on Pinus strobus. *Lophyrus Abbotii.*

*My notes are indicated by a combination of numbers and letters.
†Described as *Blennocampa bipartita.*
**Insufficiently described.

Head red, small subventral black spots; on Pinus rigida..... *Lophyrus Lecontei.*
Similar (?) to the preceding .... *Lophyrus pinetum***
20. Feeding on grass and grain (Poa, etc.)..... 21
Feeding on ferns (Pteris, Onoclea, etc.)..... 22
Not feeding on these plants..... 23
21. Ochreous, immaculate..... *4C.*
Gray dorsally, white subventrally..... *5O*†
Green, a black band over head..... *5M.*
22. A row of subventral orange spots.. ..... *Strongylogaster luctuosus.*
No orange, but head black spotted..... *Strongylogaster annulosus*††
Immaculate green ..... *Strongylogaster soriculatus*††
On Onoclea; head and anal segment black spotted..... *5G.*
23. Woolly white, gray or blackish..... 24
Green, yellowish or colourless..... 25
24. Large, greenish white, somewhat granular—
A black dorsal stripe..... *Cimbex americana.*
No dorsal stripe..... *Trichiosoma triangulum.*
With long dense white wool in flattened masses; on Carya..... *Monophadnus caryæ.*
Woolly white; on Cornus ..... *Harpiphorus tarsatus.*
White, downy; on Polygonum..... *Emphytus testaceus.*
Immaculate with white bloom; on Diervilla..... *4I.*
Dorsum gray, pruinose, a black patch on head; on Corylus.... *5F.*
White pruinose, a black band on head, a row of lateral black dots; on Sambucus..... *Macrophya tibiator.*
White with slight bloom and smoky-black markings; on Rubus ..... *Strongylogaster apicalis.*
Blackish-gray; on Viola..... *Emphytus Canadensis.*
Olivaceous-blackish; on a "perch" on Quercus, young leaves.... *F.*
Leaden-gray, pruinose with black dots; on Cephalanthus..... *5C.*
Gray with orange and black spots; on Lonicera (honeysuckle). *2F°*
Dorsum olivaceous-black with gray squares, subventer yellow; on Cornus *6O*

**Insufficiently described.
†Five larvæ of Dolerus spp. similar to this are described, but not identified.
††These names may require to be transposed.
°Described by Norton as *Hylotoma McLeayi.*

25. Greenish-ochre, a black subdorsal line; on Alnus ..... *Hemichroa americana.*
Bluish-green, spotted with yellow and black; on honeysuckle ..... *Zaræa inflata.*
Whitish, faintly orange banded; on Sambucus ..... *6I.*
Like the preceding, but also black spotted ..... *6L.*
Green or colourless, often with minute white or black points—
On Rumex; dorsum green with dark longitudinal shades ..... *Strongylogaster abnormis.*
On Rosa; green ..... *Emphytus cinctipes.*
On Betula; subdorsal yellow fat-granules.. *Tenthredo Cressoni.*
On Spiræa; a yellow subdorsal fat-line, no white points .... *5T.*
On Viburnum; with minute black points ..... *6C.*
On Ilex; colourless, whitish ..... *6F.*
On Fragaria (strawberry); head immaculate.. *Monostegia ignota.*
Like the preceding, but the head black spotted ..... *Harpiphorus maculatus.*

26. Mining in leaves of Alnus ..... *Fenusa varipes.*
Mining in leaves of Quercus ..... *Fenusa curta.*

27. Sitting flat on the surface of a leaf or curled spirally 28
Sitting on the edge of a leaf 33
Forming galls on Salix 45

28. With stiff white hairs 29
With pilose coating 30
Pale, with large elevated subventral black patches; on Salix .... *5J.*
Smooth, greenish 31
Colourless, the abdominal feet small 32

29. Anal plate black ..... *N.*
Anal plate yellow ..... { *Trichiocampus gregarius.* / *Trichiocampus viminalis.*

30. Dorsum olivaceous-black ..... *Cladius solitaris.*
Immaculate green; on Rosa ..... *Cladius pectinicornis.*
With white ad-dorsal and stigmatal lines; on Salix ..... *4L.*

31. Slightly pruinose; on Amelanchier and Prunus... *Nematus thoracicus.*
With subdorsal green fat-granules; on Betula.... *Nematus unicolor.*
Curls spirally; on Populus ..... *2G.*

32. Head pale; on the young leaves of Quercus.. *Acordulecera dorsalis.*
Head black; on the young leaves of Carya ..... *6U.*

33. Head green or greenish..... 34
Head brownish.....38
Head vinous-blackish.....39
Head black 40
34. Body with subdorsal fat-patches.....*Nematus pinguidorsum.*
Body dotted with black.....*Nematus trilineatus**
Body with lines 35
Body without lines, green 36
35. Long, straight, dusky shaded..... .....*3D.*
A distinct white subdorsal line; on Salix.....*3F.*
Dorsal vessel a double line; on Betula, etc.....*Pristiphora tibialis.*
A white stigmatal line—
On Poa, etc.....*Nematus marylandicus.*
On Abies.....*Nematus integer.*
On Vaccinium.....*Pristiphora identidem***
36. On Ribes (gooseberry) .....*Pristiphora grossulariæ.*
On Betula .....*Nematus lateralis.*
On Robinia ..... { *Nematus similaris.* / *Nematus robiniæ.*
On Populus and Salix 37
On Prunus, eating a curious sinuate hole when young.....*5K.*
On Azalea, disappearing early in the season.....*5S.*
37. With black lines on the head; on Salix.....*Nematus mendicus.*
Without black lines on the head; larger; on Populus ... .*Nematus dorsivittatus.*
38. On Alnus; green, with blackish shades..... ..*Nematus Marlattii.*
On Larix; green with more opaque bands.....*6D.*
On Prunus, etc.; vinous with obliquely cut white fat-patches ...*5Z.*
On Carex (on the top of Mt. Washington); pinkish with white bands.....*6T.*
39. On Alnus; not metallic-green shaded.....*Nematus luteotergum.*
On Betula; with slight metallic-green shades.*Nematus latifasciatus.*
40. No black tubercles on the body.....41
Black tubercles present.....43
41. With lateral yellow spots..... 42
Olivaceous, paler subventrally; on Larix.....*Nematus Erichsonii.*

*Colour of head not stated in the description, hence this position may be erroneous.
**Position of the pale line not stated.

Honey-yellow and black; on Betula..... *Cræsus latitarsus.*
Honey-brown and leaden-black; on Corylus and Alnus. *Nematus coryli.*

42. Green with black spots; on Populus.... *Nematus Hudsonii-magnus.*
All black; on Salix..... *Nematus ventralis.*

43. The tubercles minute dorsally..... 44
The tubercles of nearly equal size; body blue green; on Ribes ....*Nematus ribesii.*

44. "Black spotted"..... *Nematus pallidiventris**
A row of subdorsal black spots..... *Nematus salicis-odoratus.*
No subdorsal black spots..... *Nematus brunneus* **

45. Gall formed in the stem or bud..... 46
Gall formed in the leaf.....47

46. A lateral bud enlarged before it begins to expand in spring..... *Euura salicis-orbitalis.*
A round sessile swelling lengthwise on the side of small twigs..... *Euura salicis-ovum.*
A gradual enlargement of the twig, five-fourths to twice its normal diameter..... *Euura salicis-nodus.*

47. Fleshy, sessile, the shape of a quarter of an orange, evenly divided between the two surfaces of the leaf..... *Nematus salicis-desmodioides.*
Fleshy, globular, sessile, like a miniature apple, .3-.5 inch ..... *Nematus salicis-pomum.*
Subspherical, hollow, growing from a side vein, .2-.3 inch..... *Nematus salicis-pisum.*

48. Tubercles in a square above the spiracles, more or less distinct ..49
A single large subdorsal black tubercle; on *Rhus copallina*.....*Z.*

49. Body with a pale subdorsal line..... ...50
Body not lined..... 51

50. Head black or red; on Salix..... .....*Hylotoma clavicornis.*
Head pale with a vertical dark band.....*Hylotoma virescens* (2L).

51. Head red; spots distinct; on Betula..... ..{*Hylotoma pectoralis.* / *Hylotoma scapularis.* / *Hylotoma caeruleus.*
Head black..... 52

52. Spots distinct; on Prunus..... .....*Hylotoma McLeayi* (S).
Spots pale, often dark ringed; on *Quercus coccinea*..... .....*2B.*

*Description imperfect. Possibly not different from the following.
**Described as *N. monochroma.*

53. Head dark.....54
Head testaceous or greenish.....55
54. Head black, body orange tinted; on Prunus.....*Q*†
Head black, body dull olive-green; on Abies.....*Pack., No. 35*††
Head dark brown, body pale reddish-brown; on Abies.....*Pack., No. 36*
Head pale reddish with a black spot between antennæ; on Pinus.....*Pack., No. 82*
55. Anal plates not black spotted.....56
Anal plates with black patches.....57
56. On Corylus.....*Lyda ochreata.*
On Viburnum.....*6B.*
On Amelanchier.....*5W.*
On Pinus strobus.....*Pack., No. 83*
57. Antennæ all white; on Populus.....*5Y.*
Antennæ black ringed; on Betula.....*4K.*

I add descriptions of two species which are here referred to for the first time.

Fenusa curtus, Norton.

Mines on the upper side of the leaves of *Quercus macrocarpa*, the mature mines about 50 x 10 or 30 x 15 mm. The larva has six stages with widths of head .3, .4, .6, .75, 1.0, and 1.0 mm. The early stages are very similar to the fifth.

Fifth stage.—Head very flat, the lobes rounded with the ocellus on the dorsal aspect; mouth projecting in front; shining pale brown, shading into dark brown on the sides of lobes and mouth; eye black; width, 1 mm. Body much flattened, rounded posteriorly, the segments of nearly equal width, joint 13 divided by a distinct incisure, the posterior part only half as wide as the anterior; a rounded subventral ridge. Thoracic feet small, black, almost lateral in position, unused; abdominal, none. A large brown-black cervical shield on joint 2 dorsally and a similar one ventrally between the thoracic feet of joint 2, large, quadrate, brown, bordered with black posteriorly. Colour slightly shining sordid

†Supposed by Prof. Riley to be *Lyda fasciata*; not bred.

††No. 35 of spruce insects in Packard's 5th report U. S. Entom. Commission. I have included Dr. Packard's undetermined saw-fly larvæ only in the case of Lyda, which is such a well-marked genus.

greenish-white; length, 5 mm. The larva is not transparent, rather grayish. The cast skins are light cinereous and may all be found in the mine intact, thick and opaque.

Sixth stage.—On assuming this stage, the larvæ burst through the upper skin of the mine and fall to the ground, where they enter the earth.

Head more rounded than before, the mouth scarcely projecting. Pale watery-yellowish, the eye concolorous; width, 1 mm. Subventral ridge prominent, undulate. Thoracic feet concolorous, scarcely distinguishable. Body translucent-white with a yellow tint, becoming darker or ochreous on the thoracic segments.

Larvæ from Plattsburg, N. Y.

Hylotoma virescens, Klug.

I have recently described this larva under the name *Hylotoma McLeayi* (2L). The male flies sent to Mr. Marlatt were positively determined as *McLeayi*, confirming my own determination. However, some female flies, subsequently emerged, seem not to differ from my specimens named *clavicornis*, in which the posterior half of the abdomen is black. But, as the larvæ are quite different, I would suggest to revive the name *virescens*, Klug., from the synonymy for them. Food plants: Betula, Salix, Amelanchier, Pyrus (choke-berry and mountain ash) and Fragaria (strawberry).

Hylotoma, sp.

The larvæ marked 2B have been bred, but only males so far. Consequently I hesitate to apply a name to them.

Hylotoma clavicornis, Fabr.

Eggs (deposited by a fly with abdomen all reddish).—Laid in the edge of a leaf of Salix in the usual manner. The young larvæ are paler than the mature ones and very faintly marked. Gradually they assume the mature characters.

Mature larva.—Head rounded, full at the vertex, the sutures obscured, shining black or light red or intermediate, a little paler around the mouth; width, 1.8 mm. Thoracic feet very large, spreading; abdominal small, on joints 6–11 and 13, a spot on joint 13 representing the foot there, the posterior feet the smaller. On the body are nine black tubercles in a square, the middle anterior one a little out of line, the anterior row smaller, confused on the thoracic segments. Some small spots in a row ventrally and one behind the spiracle. Subventral ridge with a large black spot and on some segments with two or more small ones. Setæ minute, black. Body greenish-yellow, with a whitish tint, more green dorsally; a whitish subdorsal line between tubercles 1 and 2. Thoracic feet except at joints and abdominal ones outwardly black; anal feet yellow.

Larvæ from Plattsburg, N. Y., and Jefferson, N. H.

The larvæ of *clavicornis* are frequently gregarious, whereas those of *virescens* are almost always found singly.

TWO NEW CROCOTAS FOUND IN WESTERN PENNSYLVANIA.

BY GEORGE A. EHRMANN, PITTSBURG, PENN.

Crocota rubricosta, n. sp.— ♀. Antennæ and eyes black; palpi and prothorax reddish-brown; head a little lighter than the prothorax; thorax dark brown, almost black; abdomen dark brown, tipped anally with red. Under side of abdomen and thorax, including the legs, light reddish-brown.

Primaries: Upper side obscured with dark velvety-brown, slightly tinted, or dusted, with red on the costa. Secondaries: Dark brown, almost black, with a large red elongate spot on the costa—hence the name *rubricosta*.

Under side of primaries light brown; costa fiery red; the inner marginal area is also heavily dusted with red. Under side of secondaries fiery red, shaded along the anal margin with dark brown; the limbal space has a brown angulated bar, beginning at the discal cell and widening outwardly; discal spot dark brown, almost black; fringes dark brown. Exp., one inch and three-eighths. Hab.—Jeanette, Pa.

Since drawing up the above description I have been so fortunate as to secure a male in the same locality. The female was taken while beating a Hawthorn for beetles, while the male was captured around an electric light. The male corresponds with the description given of the female in every respect, except that the shade of the ground colour is a little lighter on both surfaces, and the discal spot is present on the primaries as well as on the secondaries. The species bears more resemblance to *C. opella*, Grote, than to any other North American species that I am acquainted with, but the description that I have given will show in what respects it differs.

Crocota belmaria, n. sp.— ♂. The whole upper surface is obscured with pale slaty-brown, almost of a greyish-mouse colour; the under side is much lighter, almost buff, including the legs. ♀. The upper surface is a little darker than in the ♂, and without any shading; the under side is a little lighter than the upper, but not as light as in the ♂; the costa of the primaries has a slight shading of red. Exp.— ♂, 1⅛ inch.; ♀, 1¼ inch. Hab.—Pittsburg, Pa.

I know of no North American species with which I can compare *C. belmaria;* it is the most peculiar species of this genus that I have yet met with.

THE LIFE-HISTORY OF PAMPHILA MANITOBA, SCUDDER.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

I think that I am the first man who has witnessed the hatching of the eggs of *Pamphila Manitoba*. I take pleasure in the belief; and I am glad to add another chapter to the history of our North American Rhopalocera.

Pamphila Manitoba is a sub-Arctic species. The first specimens taken in the neighbourhood of Quebec were captured by Mr. Hanham and myself in September, 1892 (See 23rd Rep. Ent. Soc., Ont., p. 31). The species had, in previous years, been taken at Riviére-du-Loup *en bas*, Cacouna, Metis, and Gaspé (See Mr. H. H. Lyman's article, 22nd Rep. Ent. Soc. of Ont., p. 27). In 1893, it appeared at Quebec on the 5th of August, and this year a specimen left the chrysalis, in my house, on the 21st of July. It would seem as if change of climate and locality were bringing forward the insect's time of appearance.

In the first week of August, 1894, I confined two or three impregnated females of the species, in a gauze cage, over a pot of lawn-grass. I obtained eggs from them on the 8th of the month. The eggs were laid dispersedly on the blades of grass and on the gauze cover. On the approach of winter I sank the pot to the rim in a flower-bed in my garden, leaving the grass and cover with their precious burden untouched. In the course of the winter the snow accumulated above them till it was six feet deep.

As soon as the gauze covering showed itself in the spring, I dug up the pot and carried it into my study, and then carefully removed the portions of grass, etc., on which the eggs appeared—placing them in a perforated cardboard box with a glass cover, which I set upon my study table. The eggs, therefore, were after that time constantly under my observation.

On the 20th of April I noticed a minute dot on the very summit of one of the eggs. I brought a magnifying glass to bear upon it, and found that the enclosed larva was biting its way to liberty; the black head of the creature was showing through the opening that it had made. I could detect the motion of its jaws as it enlarged the orifice. It continued the operation at intervals through the day and following night, and next morning, having bitten the shell down till it resembled the walls of a game pie, it crawled out. It left no *debris;* it had simply made a meal of the upper crust of its shell.

In the course of two days and nights sixteen larvæ had thus set themselves free. As each left the egg I took it up with a moistened camel's-hair pencil, and placed it on a tuft of timothy *(Phleum pratense,* L.*)* that I had rooted in a small bottle of mud, and soon I had the satisfaction of seeing the young stock begin to feed.

The fifth day seemed to be a critical period for the larvæ, and I lost several. Why this was I cannot tell. I could detect no signs of a moult. Becoming alarmed, I divided my brood, placing half out of doors on an isolated patch of grass, which I protected with a wire dish-cover. This provision proved a failure, for a small ground-beetle found its way to the larvæ, and devoured them. I adopted every precaution I could think of to save the six specimens I had left. I was careful to have healthy growing plants of grass always ready for them. I covered them with a glass shade to protect them from sudden changes of temperature. Whenever a mild rain fell I let them have for a few moments the benefit of the shower, and I kept them where they would have plenty of light without being exposed to the extreme heat of the sun. These precautions were crowned with success. I brought several of the larvæ to their full growth, and eventually I had the satisfaction of seeing the perfect insect burst from its chrysalis. The following is a detailed account of the insect in its different stages:—

Newly-laid Egg.—Nearly one-twentieth of an inch in diameter at the base. The shape of a gumdrop—flat at the bottom and rounded above. Snow-white, and in some lights irrorated with red, blue, and green.

Egg in the Spring.—Somewhat shrunken—one twenty-fourth of an inch in diameter. Dull white. Surface rough, and slightly indented. Hatched April 20th.

NOTE.—*P. Manitoba* spends eight months, or two-thirds of its existence, in the egg.

Newly-hatched Larva.—Length, one-tenth of an inch. Head large, round, jet-black, shining, has an indented line down the middle, and a few whitish bristles scattered over the face. Plate or collar on the second segment glossy black. First pair of legs black. Colour of body, that of yellow wax, marked at wide intervals with round brownish spots. The second and third pairs of true legs and the pro-legs, the same colour as the body. The creature spun a slight web for a rest, something

after the plan of *P. turnus*, and, on the 5th of May, it drew the edges of the blade of grass together, and spun a light web about itself. It moulted on the 8th of May.

Larva—Second stage.—Length after moult, three-twentieths of an inch. Head and collar black as before. Colour of the rest of the body pale waxen-yellow. The spots have developed into warts, and the body is dotted over with short black spines.

In this stage the larva made for itself a retreat by gathering several blades of grass together, and fastening them with a beautifully reticulated web, the meshes of which were as perfect as those of a cabbage-net. A funnel-shaped opening allowed the larva to protrude as much of its body as it deemed safe, to enable it to feed. In feeding, it bit from the blades till semicircular gaps were formed, thus : . It moulted May 21st. The skin of its head came away complete, like a helmet; the larva apparently having withdrawn its head from the neck opening.

Larva—Third stage.—Length, four-tenths of an inch. Head and collar jet-black as before; the former indented. Colour of body, pale grass-green. The larva in this stage is thickly set with black spines or processes. On the third and fourth segments, above the second and third pairs of legs, are, on either side, twin dark brown warts, one above the other and near together—thus (:). Over the last pair of pro-legs is a large and conspicuous wart of the same nature, and on each of the other segments are three smaller warts, one above another at wide intervals. Above the claspers are a number of bristles. The larva moulted on the 2nd of June. The head-case came away as before.

Larva—Fourth stage.—Length after moult, seven-tenths of an inch. Head deeply indented, black, with two dull yellow stripes extending down the face. Body dull greenish-yellow, very thickly set with black processes and brownish warts, giving the effect of a dull grass-green. The large wart above the hindmost pro-leg, on either side, larger and more conspicuous than before.

On the 12th of June the larva became quiescent, resting in its nest. On the 13th I noticed that the skin had parted at the neck, and that the creature was withdrawing its head (which was white and resembled parchment) from its old case. The process was not completed till 10 o'clock a. m. of the next day. Then the head rapidly darkened to black.

Larva—Fifth stage.—Head as before. Body of a dark sage-green, approaching to brown, and thickly set with minute black warty processes. A dark dorsal line and an indistinct spiracular line (of a lighter tint than the body colour) mark the larva in this stage. The spiracles are black, and the fore legs black; the pro-legs are of the colour of the body. Between the 10th and 11th and the 11th and 12th segments, on both sides at the bottom, are conspicuous white patches (or breaks in the skin), the nature of which I do not understand. The larva attained its greatest size on the 24th of June. It was then an inch and two-tenths long. It continued to feed till the end of the month. It then became restless, and shrank up considerably. On the 3rd of July it fixed upon a place for its nest. It gathered the surrounding blades of grass together and bound them with a net-work of silk, in which were flakes of whitish scurf [Query.—Did these come from the white side patches?]. It changed to the pupa on the 6th of July. Its head-case and skin came off together and fell to the bottom of the nest.

Chrysalis seven-tenths of an inch long. Head-cover and wing-cases mouse-colour. Abdomen dull yellow, with a tinge of blue above. The Imago appeared on the 21st of July—the chrysalis case having opened from the back of the head to the back of the thorax to allow of its escape.

Imago ♂.—Expanse of wings 1.6 inches; length of body .6 inch. Basal half of the primaries, ochre-yellow; outer half, brown. Near the apex is a broken curve of ochreous dots. In the centre of the wing is a long metallic dash in a dark brown setting; fringes brown. The secondaries are brown with ochreous spots and dashes; fringes gray. Underneath the primaries are paler than above, and the secondaries are sage-green with small white lunettes edged on the inner side with brown, and arranged in a double curve.

Imago ♀.—Somewhat more robust in form than the male, and deeper in colour—the brown prevailing. Instead of the metallic dash there is merely a brown patch in the middle of the fore wing. The ochreous spots on the upper side of the secondaries are more conspicuous than in the male.

The perfect insect frequents the flower-heads of *Solidago lanceolata*, L., and has a bold and rapid flight. Last season I did not see a single specimen at large.

NOTE ON THE SETÆ OF THE LARVÆ OF THYATIRIDÆ, AND A CORRECTION.

Recently I have examined the larvæ of some European Thyatiridæ, and find the setæ arranged exactly as in our species. [See Proc. Boston Soc. Nat. Hist., 1894, p. 399.] The supplementary seta behind iii. varies a little in position, but is uniformly present. The species examined are *Habrosyne derasa*, *Thyatira batis*, *Bombycia or*, *B. duplaris*, *Asphalia ruficollis*, and *A. fluctuosa*. A correction must be made in my description just referred to (pp. 400–401). The species there described in all its stages as "*Thyatira scripta*" is really *Pseudothyatira expultrix*. The following list may straighten out the matter :—

Habrosyne scripta.

1883. Thaxter, Papilio III., 10. Describes egg and sixth stage.

Pseudothyatira cymatophoroides.

1863. Grote, Proc. Ent. Soc., Phil., II., 124. Sixth stage.

1883. Thaxter, Papilio III., 10. Sixth stage.

1895. Dyar, Proc. Bost. Soc. Nat. Hist., XXVI., 400. Egg, all stages (as *Thyatira scripta*).

Euthyatira pudens.

1889. Dyar, CAN. ENT., XXI., 209. Mature larva.

Thus, the larvæ of only thirty-three per cent. of our species of Thyatiridæ are known. This is a poor showing for such a small family. Of the Notodontidæ fully sixty-six per cent. are known.

HARRISON G. DYAR.

A NEW GENUS AND SPECIES IN THE APHELININÆ.

BY L. O. HOWARD, WASHINGTON, D. C.

I recently received from Mr. T. D. A. Cockerell, Las Cruces, New Mexico, a minute parasite of a Ceroplastes on *Euphorbia hypericifolia* from the Red Hill district of Jamaica, which was transmitted to him by Dr. M. Grabham. Both genus and species prove to be new, and are printed separately, partly for the reason that my revision of the Aphelininæ of North America has recently been published and I do not expect to do any extensive work on the subfamily again for some time, and partly for the reason that Mr. Cockerell wishes to use the names in the Journal of the Institute of Jamaica. The description follows:

Aneristus, n. gen.

Resembles Coccophagus. Flagellum of antenna strongly flattened. Scape short, inserted just above the mouth and reaching to middle of face; pedicel short, triangular, as long as broad. Funicle joint 1 twice as long as pedicel, somewhat longer than broad. Funicle joints 2 and 3 each shorter than 1, and 3 shorter than 2; each about as broad as is joint 1 at tip. Club distinctly 3-jointed, a little broader than funicle joint 3; joints 1 and 2 of club subequal in length and each as long as funicle joint 3. Joint 3 of club about as long as 2, somewhat narrower at base than 2, pointed at tip. In other respects resembles Coccophagus, except that the hind tibiæ are considerably flattened and have a row of short stiff bristles above. Middle tibial spur long and slender, nearly as long as first tarsal joint.

Aneristus ceroplastæ, n. sp.

Female.—Length, .8 mm.; expanse, 1.6 mm.; greatest width of fore wing, .27 mm. Mesonotum finely and closely shagreened, with sparse, rather long, dark pile; eyes hairy. Colour black, slightly shining, all coxæ and femora black; front and middle tibiæ and all tarsi pallid; hind tibiæ black. Wings with a very large discal infuscated patch, covering nearly half the wing area.

Described from two specimens reared by T. D. A. Cockerell from Ceroplastes on *Euphorbia hypericifolia* from Jamaica.

CORRESPONDENCE.

Sir,—On looking over my paper in the CANADIAN ENTOMOLOGIST, I note one or two unfortunate errors. Page 313, lines 8 and 10, read *C. helloides* and *P. tharos* in lieu of "Epixanthe" and "Pratensis." The specimens that I thought to be "epixanthe" and "pratensis" respectively were determined by Mr. Fletcher to be only varieties of "helloides" and "tharos," and the error in my paper seems to have escaped notice and correction. I may here mention that this spring I took several specimens of *Lycæna sæpiolus*, which has hitherto appeared rather scarce in this neighbourhood. This last season has been the worst, from an entomological point of view, I have had since I came to the country. I have never seen so few insects, either Diurni or Noctuæ; and even the number of mosquitoes was considerably diminished. During May and the early part of June we had constantly frost at night, which seemed to do great damage to insect life.

E. F. HEATH, The Hermitage, Cartwright, Man.

BOOK NOTICE.

THE NATURAL HISTORY OF AQUATIC INSECTS, by Professor L. C. Miall, F. R. S. London and New York. Macmillan & Co. (66 Fifth Avenue, N. Y.) Price, $1.75. Pp. 395.

This interesting work is intended, as the author states, "to help those Naturalists who take delight in observing the structure and habits of living animals," and also to revive an interest in the writings of some of the old Zoologists who did notable work in their day, but who are now almost forgotten, namely: Lyonnet, Reaumur, Swammerdam and De Geer, of whose lives and work he gives a short account.

To any lover of Nature, who wishes to look into the lives and doings of living creatures and to investigate their structure and appliances for carrying on the business of their lives, this book will prove a very great help as well as an unfailing pleasure, and it ought to lead many a reader to explore for himself the ponds and pools in his own neighbourhood, which teem with insect life. The different groups of insects that live in the water in their larval or perfect states are treated of in turn: water beetles and the larvæ of many flies, the caterpillars of some moths, caddis worms, May-flies, Alder-flies (*Sialidæ*), stoneflies (*Perlidæ*), Dragon-flies, pond-skaters, water-boatmen, etc. The very names of these insects bring to mind what one cannot fail to have seen and watched and wondered over. To have many of these wonders explained and described, and to have the insects themselves depicted and the peculiarities of their structure made clear by excellent wood-cuts, is what we owe to the author of this book, and we hope that many will turn to its pages with profit and delight. It is a handsome volume, with clear, large type and a number of very good illustrations.

THE FIRST ANNUAL REPORT of the Entomological Society of Ontario, 1870 (published early in 1871), has just been reprinted *verbatim* by the Department of Agriculture for Ontario. It was thought best to reissue the volume without any alterations or attempt to bring it down to date, as it is chiefly wanted for completing sets in libraries and private collections. That there should be a demand for a work of this kind nearly a quarter of a century after its first publication is a somewhat remarkable event. Copies may be obtained by applying to Mr. J. A. Moffat, Victoria Hall, London, Ontario.

Mailed December 9th, 1895.

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